University air travel and greenhouse gas mitigation: An analysis of higher education climate policies

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Abstract

Higher education institutions have been involved with environmental and sustainability issues since at least the 1970s. More recently, efforts have shifted to a specific focus on climate change. Numerous institutions have created policies that aim to reduce their carbon footprints, with an emphasis on energy production and consumption and reducing their greenhouse gas emissions. One area that has received less attention has been greenhouse gas emissions from university air travel. The present research used qualitative document analysis to examine the climate policies of 46 public doctoral institutions to understand how they address university air travel greenhouse gas mitigation. Five major themes emerged in this research: no consideration of air travel, lack of quality data for accurate consideration, recommendations to offset air travel emissions, support for videoconferencing, and other suggestions for mitigation. These themes are discussed in detail, as are practical suggestions and implications stemming from this and related research.

Since the 1970s, colleges and universities have made numerous commitments to environmental sustainability. Early commitments, such as the *Tblisi Declaration* (1978), promoted higher education institutions' roles in fostering environmental education. Other commitments, such as the *Talloires Declaration* (1990), garnered support from institutional administrators to commit to embodying various sustainability practices (Wright, 2002). One of the more recent commitments, the American College and University Presidents Climate Commitment (ACUPCC) has a more specific focus: addressing climate change: (Medlin & Cortese, 2008). Launched in 2007, this commitment was signed by more than 500 signatories across all 50 states by 2009 (Second Nature, n.d.). The ACUPCC did more than enable universities to collectively commit to efforts in reducing their carbon footprint. It also specifically offered guidance to universities on the steps in mitigating greenhouse gas emissions (GHGE) and achieving carbon neutrality. This commitment is now known as the President's Climate Leadership Commitment and has bolstered its guidelines with clear climate action plan structures, a funding scheme, carbon offset resources, and supporting SIMAP, a platform used widely among institutions to report and track their GHGE profiles.

According to Medlin et al. (2008), institutional climate commitments are important, as they fit "squarely into the educational, research, and public service missions of higher education. Indeed, no other institution in society has the influence, the critical mass, and the diversity of skills needed to successfully reverse global warming" (p. 10). In other words, higher education institutions play an important role in not only researching and solving climate crisis issues but serving as an agent of change for society in general. The impact of the ACUPCC has spawned numerous institution-specific climate action plans and real campus effects in reducing GHGs, using alternative energy sources, and implementing other green campus initiatives.

Of the three scopes of GHGE (EPA, 2018), most efforts of institutional climate policies have been focused on reducing Scope 1 (e.g. from energy generation) and Scope 2 emissions (e.g. from purchased electricity). Scope 3 emissions include commuting, business air travel, food systems, and any other emissions not part of Scope 1 and 2. Because these emissions are not controlled by the institution, they are often the hardest to track and mitigate. While Scope 3 emissions are often recognized in climate policies, in particular commuting and travel, these emissions are relatively unaddressed (Cleveland & Jay, 2020). This is despite the fact that air travel emissions alone can make up to around 30% of an institution's carbon footprint (e.g. University of California-Santa Barbara, 2016).

Concomitant with broad institutional commitments to mitigating climate change, there has been a growing emphasis in higher education that focuses specifically on air travel (Caset et al., 2018; Charmaz, 2003; Grant, 2018; K. G. Høyer, 2009; K. G. Høyer & Næss, 2001; Levine et al., 2019; Nevins, 2014; Pedelty, 2008). Academic air travel has been indicted as “one of the most significant ways that academics contribute to anthropogenic climate change” (Levine et al., 2019). In particular, conference travel has been recognized as a major source of these emissions (e.g. Høyer & Næss, 2001). For example, Chalvatzis and Ormosi (2020) estimate that over an 18 year period, economics conferences alone have likely been responsible for 6.6 billion flights (50 billion kms), resulting in 5.5 million metric tons of CO_2 emissions. Considering the sheer number of conferences and their attendees, it is easy to see the magnitude of academia’s impact. There is also the concern of the “paradox” of academic travel (Caset et al., 2018). Many scientists travel around the world to discuss the very topics to which they are either contributing to or undermining (see also Attari et al., 2016) while also contributing to an issue that

disproportionately "impacts people of color and low-income populations and countries" – issues of central concern for many academics (Nevins, 2014).

These authors are sounding an alarm not only on a paradox but also on an impending problem. Aviation contributes up to 3.5% of anthropogenic-caused climate change, and, due to the height at which planes fly, their effects on climate change through CO_2 and other GHGE (represented together as carbon dioxide-equivalent, CO_2e), soot and sulfates, and cloud over-creation, have a more direct effect on the radiative forcing in the upper atmosphere compared to emissions from the ground (Lee et al., 2021). Furthermore, flying is the most carbon-intensive individual activity one can partake in. A single flight can emit 700 to 2,800 kg CO_2e, depending on distance flown (Wynes & Nicholas, 2017). This can represent more than 50% of one's personal carbon budget necessary to limit warming to 1.5°C (Akenji et al., 2019). The emissions from one flight can easily surpass the annual per-capita emissions of many countries. For example, a flight that emits one metric ton of CO_2e is roughly equivalent to the amount of CO_2e a citizen of Haiti may emit over an entire year[1]. This figure only hints at issue of inequity of air travel and the inequity of climate change, to be discussed later. A single academic conference can be responsible for between 300 metric tons (646 participants; Desiere, 2016) to 8,646 metric tons (4,832 participants; Bousema et al., 2020) or more from travel alone. For perspective, one metric ton of CO_2 is associated with the loss of approximately 3 square meters of sea ice (Notz & Stroeve, 2016).

Worldwide, air transport is projected to increase by 3.5% per annum, with air passengers doubling to 8.7 billion within twenty years (IATA, 2018). This growth in travel has already outweighed mitigation efforts to reduce the effects of aviation (IPCC, 2014). In 2018, US

[1] 2018 per-capita CAIT data based on all GHGE combined

passengers accounted for a quarter of global airline traffic (Graver et al., 2019). No accurate data is available that estimates what percentage of this travel is university-related. However, given that air travel can account for up to 30% of an institution's footprint, that there are around 5,000 higher education institutions in the United States, and that there are legions of conferences each year, academic travel is responsible for a large swath of emissions. Continued growth in air travel without efforts to make drastic changes indicates a continuing negative impact on the climate. These facts have even prompted many higher education faculty and staff concerned with climate change to join a grassroots "flying less movement" (see http://flyinglessresourceguide.info/, https://noflyclimatesci.org/).

While much research has been published on issues surrounding academic travel (Caset et al., 2018; Gössling et al., 2019; Grant, 2018; K. Høyer, 2009; K. Høyer & Næss, 2001; Nevins, 2014), there is scant research on how institutions have attempted to address these issues. Hoolohan et al. (2021) offer perhaps the first attempt to examine institutional responses. The authors utilized document analysis to examine 66 UK institutions' policies related to air travel and meat consumption (also part of Scope 3 emissions). Regarding travel, they found acknowledgement of the issue of air travel by half the institutions. They also found a minority of institutions include actions to reduce air travel, mostly through increased train travel, prohibiting business class or domestic flights, and fostering voluntary behavior changes. While these policies are useful, they may not translate to the United States' higher education context, especially given the size of the country and the lack of convenient rail travel.

The purpose of this research, therefore, is to understand how US higher education policies address university air travel emissions. Specifically, this study uses qualitative document

analysis to summarize findings from 44 institutions' climate policies. The research highlights specific policy themes as well as positive models for addressing these emissions in the future.

Methodology

Sample

The research includes data from 44 doctoral institutions in the United States. These institutions were chosen according to several different sampling methods. The first sampling method was a hybrid of homogenous and convenience sampling (Glesne, 2016). This method began with the author's home institution and included its comparative (n = 11) and aspirational peers (n = 6). This was a convenience sample in that the institutions were already selected. It was also a homogenous sample, with institutions all sharing similarities in terms of enrollment, size, and mission. In addition to this hybrid approach, a criterion of inclusion approach was used, in which institutions are selected based on some predetermined criterion (Palinkas et al., 2015). For this group, all Top-25 public research institutions (as ranked by US World and News, 2020) were selected (n = 22; three institutions overlapped aspirational peers). This group of institutions was selected to include how highly-ranked institutions considered university air travel as part of their climate policies while still being comparable to the initial group (i.e. they are all public doctoral institutions). A final group of institutions were chosen based on extreme case sampling. These institutions were chosen for their notable travel-related emissions policies (n = 4).

Each institution's Office of Sustainability website was explored and all documents related to GHGE were downloaded and coded. These documents included climate action plans, sustainability plans, strategic plans, annual reports and updates, as well as relevant web pages and news reports. Some available documents were 10 years old, or older, and may have been out

of date or no longer considered official policy. While preference was given to more recent versions, including any updates and recent drafts, older policy documents still can shed insight into how the institution has considered air travel-related emissions.

Data Analysis

Documents are often not the primary consideration for qualitative research. They are typically considered secondary to such sources as interviews or focus groups (Owen, 2014). Owen (2014) argues, however, that documents indeed serve as a valid source of qualitative data, especially when serving as a data source for policy analysis. Like people, documents are situated, not fixed, and are a product of a particular social setting rather than existing in a vacuum. Furthermore, for higher education, documents help define an institution's organizational activity. Prior (2003) writes that an institution "is in its documents rather than its buildings…The charter – together with other documents – names the university, provides warrant to award degrees, and legitimizes the officers of the university and so on" (p. 60). An institution's policies as written in such products as climate action plans, therefore, serve as important documents that help define the organizational activities institutions have taken in regard to the climate crisis. It is for this reason document analysis is the primary methodology for the current research.

There are many ways to undertake document analysis. Because a main goal of this research was to describe how travel emissions are considered in official climate policies, a more descriptive approach was followed. In particular, thematic analysis was employed. Broadly speaking, thematic analysis involves "searching for themes and patterns" (Glesne, 2016). It is often defined as a descriptive method but can also be interpretive, with various configurations between those two extremes (Braun & Clarke, 2006). Among the various forms of thematic

analysis, they all share "a search for certain themes or patterns across an (entire) data set, rather than *within* a data item (Braun & Clarke, 2006, p. 81; emphasis in original).

The current research sought to establish themes across a range of climate policy documents from the sampled institutions following Braun and Clarke's (2006) detailed methodological description. In particular, the current research sought to establish a rich description of the policies via an inductive approach in which the themes have a direct relationship to the data and do not need to be interpreted nor guided by any theoretical construct.

Only information related to university air travel was used in this research. The analysis began by searching documents for keywords (scope 3, travel, air travel, business travel) to identify sections pertinent to air travel. As sections were identified, descriptive codes of relevant text were generated to help develop an inventory of the data (Saldaña, 2013). This initial coding aided in understanding the genre of climate policies, their language, and how they were organized. Once approximately half of the documents were coded, descriptive codes were collated into themes based on their shared meanings. These themes were then used during a second round of coding, in which more documents were analyzed and coded based on the identified themes. Themes were descriptively named based on the recurrent keywords appearing in the text.

In order to establish trustworthiness (i.e. internal validity), the manuscript went through peer review among colleagues and several experts in field (Merriam & Tisdell, 2016). As a further step towards establishing trustworthiness, member checking was used (Glesne, 2016). Each institution's sustainability office was contacted with a draft of this manuscript and asked to check whether their institution's policies were correctly included. Of the 46 institutions contacted, 14 replied, leading to minor manuscript revisions in wording or specificity. Most

replies were either to confirm results or offer updated documents published after initial document collection.

Consistency (i.e. reliability) was established through the use of intercoder consensus (Saldaña, 2013). Two colleagues were given a random sample of policy documents and asked to apply the pre-established themes and code other salient areas openly. There was general agreement in the coding of identified themes and any additional codes led to further theme refinement.

Findings

The following sections outline the major themes found in the public-facing institutional policy documents regarding university air travel. A visual summary is presented first in Figure 1 and more detailed tables appear in the appendix, with links and citations for each institution.

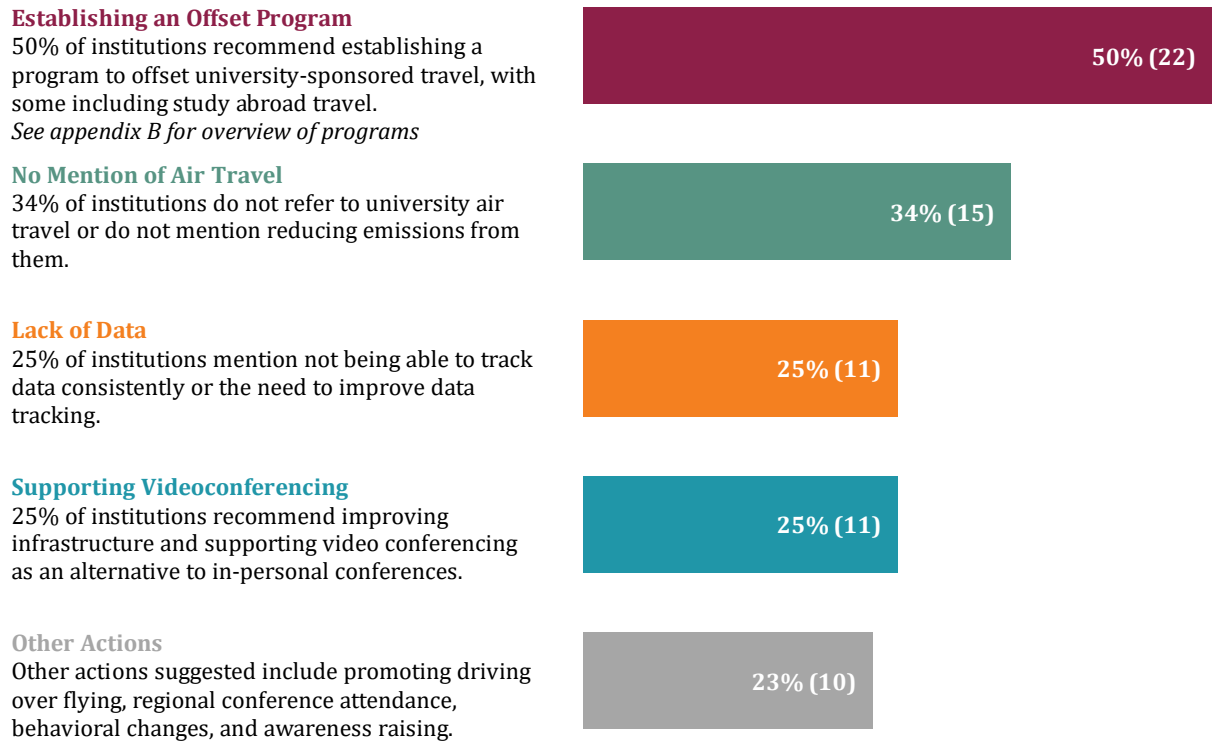

Figure 1. *Summary of themes from an analysis of institutional policies related to university air travel GHGE mitigation. Number of institutions represented in parentheses.*

Establishing an Offset Program

Establishing an offset program was the most prevalent policy theme among the institutions sampled. Around 50% (22) mentioned offsets in some way, typically as a recommendation (n=17) or as an implemented policy (n=5; see Appendix B). Some offered sparse details on their recommendations. For example, in 2017, the University of Alabama (2017) suggested a "Green Fee" be established to offset directly-financed air travel. However, this suggestion is sparse on details and no further information could be found on their website as of May, 2021. The University of Tennessee, Knoxville (2020) offsets as a "policy opportunity", but with no further details. The University of Michigan (2021) recommends funds from a "carbon price" on travel by personnel and students would fund the reduction or offsetting of institutional emissions. Subsequent visits to websites (and, in some cases, email inquiries) of these and other institutions recommending establishing offset programs show no indication these recommendations were acted upon, even when these suggestions were made over ten years ago.

While it seems offsetting air travel remains a recommendation for most institutions that have considered this policy action, several others have taken important steps in implementing them. Arizona State University implemented a carbon offset program beginning in 2016. This program began as voluntary with three different offset costs but had limited uptake. Because this program was deemed important, it became mandatory and a single flat fee was introduced to simplify the process. Fees are used for The Carbon Fund and serve as financial resources for several local offset programs (Dalrymple, 2018).

In 2017, the University of Maryland began the Carbon Neutral Air Travel Initiative to offset emissions from university-sponsored air travel (including athletics and study abroad)

through the purchase of "verified carbon offsets or new investments in on-campus emission reduction activities to negate emissions associated with air travel." According to their Carbon Neutrality dashboard (n.d.), from 2017 to 2019, the university has been able to offset 145,664 metric tons of CO_2e of combined directly financed and study abroad air travel.

The University of California-Los Angeles has begun piloting an Air Travel Mitigation Fund, a program of tier-based fees for all university-sponsored travel. The fee for a round-trip domestic flight is $9, and a round-trip international flight is $25 (Menton, 2018). The fees will be used to fund local GHGE mitigation projects. Oregon State University created the Carbon Offsets Program, which is a voluntary program for university-funded travel. Travel details are submitted to the Sustainability Office, who then helps coordinate offset purchasing through the traveler's unit. Offsets have funded local offset projects, such as a sustainable harvesting program called the Winston Creek Carbon Project.

No Mention of Air Travel

A major theme that became apparent in the data was not the *inclusion* of information but the *exclusion* of it. Of the 44 institutions included in this research, 34% made no policy references to university air travel at all. In some cases, (e.g. Pennsylvania State University) air travel is included in charts or similar breakdowns of GHGE sources, but no further policies are evident. In a majority of cases, no mention of air travel means no reference was made to recognizing university air travel as a contributor to institutional GHGE. This also means that there was no collecting, tracking, or reporting of university air travel data. In some cases, commuter data or other Scope 3 emissions were considered, but not university air travel.

Lack of University Air Travel Data

A related theme was the recognition that data is lacking or of poor quality. Twenty-four percent of institutions referred to the difficulty of collecting, accessing, and tracking university air travel. Many institutions report that tracking travel data is a necessary first step to establish baselines against which to compare subsequent years and policy effects. Lacking quality data or any data at all obfuscates such baselines. Several institutions mentioned not tracking data at all due to lack of data collection or because estimates are not required by the GHGE inventory tools that the campus uses. Others focused on poor data quality. For example, several institutions included air travel emissions in their GHGE profiles, but admitted they only serve as rough estimates:

> Faculty, staff, and students do not currently track miles traveled so methods for estimating travel are based upon generalized factors that convert dollars to miles traveled based on a report from one travel agency that is commonly used by University employees. (University of Minnesota, 2011, p. 13)

For other institutions, data is limited to only travel purchased through the university and does not include travel that is paid for personally and then reimbursed. According to the University of Connecticut Climate Action Plan:

> in-house data was determined to be of limited utility for inventorying purposes. In certain cases, off-campus travel is paid for directly from a department budget (i.e. Athletics). Typically, however, an individual pays their travel expenses out-of-pocket and applies for reimbursement through the University Travel Services Department. Records of personal reimbursements are not itemized. (2009, p. 40)

The University of Florida referred to similar issues, stating "UF does not currently have plans to directly offset air travel GHGE (partly due to our very dirty air travel datasets which need to be improved at the source)" (2009, p. 34). Likewise, the University of Wisconsin states that "Data on [university air travel] is also difficult to obtain…For these reasons, we did not attempt to gather and analyze data on these additional trips" (2010, p. 43).

Nevertheless, those institutions referring to issues with data collection often recognized its importance. The University of Wisconsin continued: "[w]e do recommend actions be taken to improve their efficiency" (2010, p. 43). The University of California-Santa Barbara wrote "It would be beneficial for the campus to begin the process of quantifying and reporting these emissions for future inclusion into the Climate Action Plan" (2019, p. 9). Auburn noted plans to improve tracking and work with business services to establish a tracking system. Despite tracking issues, a number of institutions were still able to develop policies or recommendations alongside recommendations to improve their data. Some of these institutions and their subsequent actions are included in the remaining themes below.

Supporting Videoconferencing

Videoconferencing was another policy that was mentioned among the institutions in the sample. Twenty-five percent of institutions recommended videoconferencing as an alternative to conference travel. Some institutions spoke in general about "increas[ing] use of virtual meetings to reduce travel and costs and increase efficiency" (North Carolina State University, 2017, p. 11). Other institutions, such as the University of California-Davis recommended "additional resources be made available to improve and grow facilities and equipment for high-quality remote conferencing" (2010, p. 38).

The University of California-Santa Barbara Climate Action Plan (2016) promotes the "Nearly Carbon-Neutral Conference Model" (Kiltner, n.d.). This is a model designed by Dr. Ken Kiltner, Director of the University of California-Santa Barbara's Environmental Humanities Initiative. This model provides a rationale and framework for virtual conferences while allowing dissemination of ideas, cost reductions, and improved discussion. One concern about virtual conferences is the loss of face-to-face interaction. Kiltner's data from 2016 indicated the model was able to foster meaningful connections (as rated by 73% of respondents to a post-conference survey).

Since 2016, and especially during the COVID-19 pandemic, virtual conference platforms have evolved significantly and can be much more effective at simulating the "hallway" conversations of in-person conferences (e.g. gather.town) than what Kilter proposed (e.g. WordPress websites). Indeed, much of the world has had a chance to experience video conferencing during the COVID-19 pandemic and the promise of video conference as an alternative to in-person conferences has been tested. However, the pandemic has also fostered "zoom burnout" and poorly-planned online conferences (e.g. American Education Research Association, 2021), which may have left many with negative perceptions of online conferences.

Drawing on experiences from the shift to virtual work, University of Illinois cites telecommuting in general (not just for conferences) as "highly manageable for campus units" (2020, p. 75). Their Illinois Climate Action Plan suggests that they see videoconferencing as a plausible solution to growing emissions from university air travel. They state that the transition to remote work highlighted the need to "take stock of current teleconferencing capabilities and assess the need to invest in a higher quality and/or quantity of digital infrastructure as we move toward air travel alternatives" (p. 76).

It must be acknowledged that online conferencing is by no means carbon-neutral. Faber (2021) estimated emissions for a 200-person, 6-hour Zoom conference at 1.3 metric tons of CO_2e. This is roughly equivalent to the emissions of a single one-way flight from Los Angeles to Washington, DC. These emissions will vary based on participants, conference length, computer types, and various other energy needs. However, when hundreds of other travelers and the venue's associated emissions, including its computing energy requirements, are added in, it becomes evident that online conferencing contributes a fraction of the climate impact of an in-person conference.

Other Ideas

The broad theme of "other ideas" includes a mix of policy recommendations, calls for awareness, and suggestions of behavior changes. This theme was evident in 23% of the institutions sampled. About 14% of the 44 institutions recommended "behavior changes," often without further explanation of what these changes should be. Some refer to a general reduction of flying (e.g. University of Tennessee, Knoxville; University of California-Santa Barbara). Others promote more specific behavior changes, often as part of a broader travel policy. For example, several institutions have discussed promoting driving instead of flying. The University of Georgia gives the specific recommendation of driving when a conference is within six hours. Driving distance and vehicle fuel efficiency need to be important considerations when suggesting driving over flying. For example, for a 6-hour, 400 mile drive, a flight would emit 500 kg CO_2e; fuel-efficient vehicle would emit 330 kg CO_2e; and a large, four-wheel drive vehicle would emit 1,100 kg CO2e (Berners-Lee, 2011). With university fleets switching to hybrid and all-electric vehicles, driving over flying could make a significant impact on GHGE reduction efforts.

Raising awareness of the carbon footprint from flying was suggested by 7% of institutions. Duke notes that few on campus are aware of the impact of flying and suggests raising awareness of carbon footprints by issuing "carbon awareness invoices...to departments" (2009, p. 28). The University of California-San Diego and the University of California-Santa Barbara both suggest creating an outreach program to raise awareness. According to University of California-Santa Barbara's Climate Action Plan:

> Most faculty and staff are unaware that business air travel accounts for almost [11%] of UCSBs total emissions. Information should be disseminated throughout the campus departments regarding the impacts of air travel, alternative options available, and the time and cost savings associated with teleconferencing and telecommuting. (2016, p. 27; corrected by J. Persad, personal communication, January 5, 2021)

Santa Barbara also recommends, without further details, incentivizing reductions and making offset purchases part of grant requirements. University of Michigan also suggests awareness raising: "Widespread and frequent educational cues will be critically important to remind the U-M community how their choices impact the environment and the university's carbon neutrality goals" (2021, p. 42). Other ideas include Rutgers' suggestion of capping university air travel. Though no further details are given, such a cap could be set at the department level and take into consideration department size and frequency of travel.

Discussion and Implications

The analysis of institutional climate action plan documents revealed that policies related to addressing air travel are mostly lacking. While these documents often have extensive discussions and evaluations of energy production and consumption, scant attention has been paid

to air travel. This is despite emissions from air travel often being a major contributor to institutions' carbon profiles. While many institutions GHGE charts showed decreases for Scope 1 and 2 emissions over time, they often showed increases in air travel emissions. This is likely related to lack of policy considerations. It also echoes projections that show that flying in general is predicted to increase, with the number of flyers doubling by 2030 (ICAO, 2018). Taken together, the lack of air travel policy implementation does not bode well for reducing institutional carbon footprints or keeping global average temperatures below 1.5 degrees Celsius in order to mitigate the climate crisis.

That one-third of a small sample of institutions, including Top-25 research universities, have absolutely no mention of university air travel in their climate policies is troubling. A similar finding is echoed by Hoolohan et al. (2021), who found that around half of UK institutions analyzed did not acknowledge air travel emissions. There are several potential reasons for this. One reason could be that there is simply a lack of awareness of air travel as an environmental issue, though this is likely unrealistic. The problem of flying in academia has been discussed in both popular media (e.g. The Chronicle of Higher Education [Pedelty, 2008], Times Higher Education [Bothwell, 2019], LSE Impact Blog [MoChridhe, 2019]) and peer-reviewed journals (e.g. Caset et al., 2018;; Grant, 2018; Høyer, 2009; Høyer & Næss, 2001; Nevins, 2014). Another reason could be, as the themes identified above suggest, that lack of viable policy options that could be feasibly adopted by the institution may have prevented their inclusion in official documents. A further reason why a third of institutions made no reference to university air travel could be that they simply did not have any data to consider. In fact, almost a quarter of institutions described issues of obtaining and tracking accurate travel data. Unlike institutions

that had no mention of air travel, the fact that some institutions recognized data as an issue is a positive sign of awareness of travel as an issue and is a first step in addressing.

Another reason for both limited consideration and limited policy implementation towards air travel-related GHGE mitigation could be the difficulty in addressing it. Air travel is perceived of as an essential function of academia. There is a perceived "obligation of presence" that underlines much travel in higher education (Higham et al., 2019). To limit academic travel may be seen as leading to "career demise" (Grant, 2018). The 2009 Climate Action Plan from Duke University states this directly: "air travel demand for academic institutions is also difficult to manage since so much of the need to travel is directly related to the academic mission of the university, advancement of its faculty and staff, and propagation of its reputation" (p. 28). Air travel is deeply a part of academic culture, seen as a foundational aspect of higher education as an institution and as a career. Any attempt to reduce air travel will be a difficult task.

Nonetheless, while networking, field work, and conducting and sharing research as a reason for academic travel are no doubt important to both mission and career, many authors have made it clear that the urgency of the climate crisis means that there must be radical shifts in how academia operates. Bonnett (2006) writes that "the glory days of guilt-free and gleeful world winging are gone. Travel is no longer an escape. It is a responsibility" (p. 230). Nevins (2014) argued that "We need new professional habits," which will involve collective effort from all of academia and "sacrifices" or "changes" (p. 307). Likewise, Hoolohan et al. (2021) argue reducing emissions requires that universities participate more fully in reconfiguring the system within which unsustainable workplace practices arise" (p. 10). That is, institutions must foster and normalize changes in sustainable professional practices. Without shifts in norms, those who

currently attempt to reduce flying may "meet considerable challenges in attempting to excel against the usual institutional and scholarly measures of success" (Grant, 2018, p. 132)

The concept of "changes" was suggested in several of the institutions' documents analyzed. Some recommended considering driving over flying, while others suggested a general reduction in flying. These were far less common than the more common recommendations to establish offset programs. Offsets are likely the most suggested policy action because they do not threaten current academic culture. Instead, offsets are a relatively easy to implement system of fees, with little extra thought required on the part of the traveler. The issue, however, is that reducing flying amounts to real change – less CO_2 in the air – whereas offsets are problematic. Among their many criticisms, carbon offsets are "imaginary commodities" that represent a charge for sequestering carbon that may or may not have been captured (Broderick, 2009; Elgin, 2020). They also shift responsibility for emissions from polluter to consumer (Mair, 2011), and often from the developed world to the developing. In the end, their effect is questionable, especially in comparison to not having emissions to offset in the first place.

As an alternative to travel, 25% of institutions supported videoconferencing. This support was in terms of both better infrastructure as well as administrative support for telework (leading to reduced commuting) and videoconferencing for conferences and related academic pursuits (leading to reduced air travel). This is one example of reducing travel via alternatives. As reported previously, the University of Illinois' Illinois Climate Action Plan specifically considers the forced changes induced from COVID-19 restrictions, giving insight into newer perceptions of videoconferencing and related changes. As an institution, they have recognized the "capability for adopting these technologies and integrating them into our daily lives," something which they hope to support in the future (p. 76). This signals a possible shift in the acceptable "measures of

success" Grant (2018) references and shows signs of cultural shift in academia as virtual presence becomes more normalized. Following the University of Illinois' example, the continuation of these practices certainly justify reduced travel via video conferences as an institutional policy.

There are further considerations to justify reductions in travel. First is the realization that changes in travel behavior leading to "career demise" may be based on perception more than reality. Some evidence suggests there may be no significant relationship between air travel and research productivity (Chalvatzis & Ormosi, 2020; Wynes et al., 2019). Chalvatzis and Ormosi (2020) found that while travel and citations are positively related, higher citations are not associated with distance travelled. The authors suggest researchers should focus more on local or virtual conferences. They estimate that halving the miles flown in their sample (414 million km) would have led to a 25,000 metric ton reduction in GHGE.

Wynes et al (2019) also report no significant relationship between travel and academic productivity (h-index). However, these authors did find that salary and rank were significantly associated with emissions, suggesting senior researchers travel more. While no causal inference could be made, the authors suggest that seniority may lead to increased travel rather than the opposite given that there may be a lack of association between travel and productivity. The authors suggested that senior researchers could fly less without negatively impacting their scholarly productivity. This action could reduce institutional emissions while still allowing junior faculty and graduate students a base level of travel to facilitate career progression. In lieu of shifts in academic culture, such a practice could inform departmental caps that several institutional policy recommendations alluded to.

Furthermore, there must be a consideration of the ecological inequity caused by academic flying. Nevins (2014) writes that: “Not all contribute equally to climate change, nor are the associated effects experienced equally” (p. 300). The author is referring to the fact that flying, especially academic flying – the ability “to fly great distances with relative ease” is a privilege enjoyed by a small percentage of the world, and it is this small percentage (1%) that contribute to most of the world’s aviation emissions (50%; Gössling & Humpe, 2020; see also UN Environment Programme, 2020. These emissions from the privileged few are set to impact the unprivileged many – those who experience poverty, refugee crises, and other humanitarian issues. Grant (2018) cites the UN Human Rights Commission, which states that climate crisis is “set to tremendously exacerbate these and other issues connected to social justice and human rights” (p. 126).

There are still further reasons why institutions should take air travel GHGE mitigation seriously. Recall that one impetus behind the American College and University Presidents Climate Commitment was because addressing climate change fits into the mission of higher education and serves as an influential model for society. Enacting changes in university-related travel can allow higher education institutions to remain leaders in carbon reductions. In fact, Osborne et al. (2019) argue that “In the long term, these actions will not only reduce our emissions and protect our reputation [as well as] level the playing field and drive more change across the sector” (p. 33).

Limitations

The present document analysis was limited to a small sample of 44 U.S. public doctoral institutions, a fraction of the 214 institutions within this group in the United States, and an even

smaller fraction when considering public and private institutions across Carnegie classifications (National Center for Education Statistics, n.d.). Therefore, this analysis only offers a glimpse at the current landscape of air-travel related climate policies. It cannot and is not meant to be generalized. Still, it serves as useful insight into how some of the United States' largest higher education institutions have handled one aspect of the climate crisis.

Furthermore, this document analysis included only publicly-available documents accessible via institutional websites. There may be additional or *de facto* policies that were not included in the data. Given the age of some documents (several around a decade old), drafts or revisions may be under development. In fact, several institutions' drafts (e.g. Duke, the University of Illinois, the University of Nebraska-Lincoln) were included. In addition, during the member checking process, several documents were updated to versions created after initial data collection These drafts allows inclusion of the most recent policies available.

Finally, an institutional policy document existing does not mean it is being followed. For example, the *State Press*, an Arizona State University student media organization, reported that the institution abandoned its 2011 sustainability plan in 2015, as its goals were deemed too ambitious and infeasible (Stellino, 2019). The number of institutions that may have taken a similar course is unknown. This impacts the association between policies and actions described in this analysis. That being said, straying from plans laid out in policy documents does not necessarily mean lack of action. Arizona State University is one of the few examples of a higher education institution with an active air travel offset program. However, whether or not an institution follows its policy recommendations and how this relates to its actions remains for the most part an unknown variable in this analysis.

Suggestions and Implications

Based on the analysis of 44 institutions, few have found successful ways to deal with the air travel, which is seen as fundamental to academia. Nevertheless, the present analysis does highlight several policy themes which serve as suggestions that institutions can follow to move towards reducing GHGE related to air travel. These suggestions take into consideration both institutional and individual responsibility for minimizing carbon emissions from flying.

First, data should be at the heart of any effort to address emissions. Institutions must make sure that travel data is collected, accurate, and analyzed. Colleges and universities need to understand the overall footprint of their institution. This serves as a baseline from which to measure future progress. Second, offsets, despite their controversial nature, can be an easy first policy to implement. These programs can also be more impactful if they fund local GHGE mitigation projects rather than offsets bought from third-party providers. Several institutions (e.g. Arizona State University) have successfully implemented flat-fee systems that fund local projects and have a tangible impact on reducing emissions.

The document analysis indicated that change can go beyond data- and financially-centered solutions. Behavioral changes, such as supporting driving instead of flying, prioritizing local and virtual conferences can reduce travel-related GHGE. The global pandemic has made such behavior changes temporarily the default. In an interim report on work towards a new Climate Action Plan, Rutgers University recognizes this fact and hopes that "perhaps from the present crisis we will collectively learn about opportunities to reduce physical business travel and increase telecommuting without lowering productivity" (p. 14). Mandatory behavior changes, such as eliminating business class flights, establishing no-fly zones a certain distance away from one's institution (e.g. 300 miles), and placing caps on air travel are other ideas

mentioned throughout the documents. Further, perhaps more foundational, changes can include raising awareness of the issue to help individuals make their own choices about whether and how to travel (see, for example, the Tyndall Travel Strategy decision tree [Tyndall Centre for Climate Change Research, 2014]).

There were several general calls to reduce flying, which can be interpreted as fewer trips or complete replacement with virtual-only presence. Policies and institutional cultural shifts that support such decisions are important, though their implementation and effects in higher education have yet to be studied (see Katze-Rosene et al., 2019; Kreil, 2019 for additional suggestions). Aside from institutional policies, bottom-up efforts of individuals reducing their own flying may also be effective strategies for GHGE mitigation. Hoolohan et al. (2021) argue that individual employees can contribute to organizational sustainability through for example, shifts in resource usage (turning off lights or using less paper). Personal behavior can often become an agent for change to others. In justifying her own reduction in flying, ethnomusicologist Catherine Grant writes that her "stance on academic flying, if well-articulated and backed with action, may influence to some degree the thinking and actions of my colleagues on the matter" (2018, p. 130). Indeed, research has shown that one's behavior can influence those around them (Abrahamse & Steg, 2013; Wolske et al., 2020). This can affect not only individual action but, with a "committed minority," institutional and cultural change (UN Environment Programme, 2020, p. 72).

Future research can expand the sample and scope of the current study by investigating institutions within a specific geographic region, or institutions from the range of institutional types. Furthermore, this research does not attempt to address administrators, faculty, and staff

perceptions of travel or their willingness to engage in actions to reduce GHGE. Such research could help give deeper insight into effective policies.

Conclusion

Many higher education institutions have made serious commitments to carbon neutrality, mitigating greenhouse gas emissions, and serving as climate-responsible leaders in society. The present research examined 44 institutions' policies towards university air travel-related GHGE. Five key themes in the documents were found. A number of institutions simply have not considered university air travel in any visible way. A smaller but not insignificant number of institutions report many issues with collecting and tracking accurate data. In terms of impacting GHGE, many institutions have recommended, but fewer have implemented, travel-related offset programs. Institutions have also supported videoconferencing and a smorgasbord of other behaviors, ranging from driving instead of flying, awareness raising, and reducing flying altogether.

It is important to recognize that travel-related GHGE mitigation is an institutional and an individual responsibility. Institutions need to take a leadership role by beginning to radically address GHGE from flying. Individuals need to address their own footprints as well, working with policy makers to ensure sound climate action. Travel in academia has come to pose a serious problem, the continuation of which harms the planet and the economically disadvantaged, and the cessation of which is seen as posing serious issues to career and higher education mission. However, given growing concern about climate change, the need to drastically reduce emissions across the board, and the fact that it is a high priority for the new Biden administration (UN Environment Programme, 2020), any action taken to reduce

academia's impact on climate change could be seen as laudable rather than questionable. It can signal not "sacrifice" as Nevins (2014) wrote but cultural change. The sum effect of such efforts will be a positive impact on the university and, ultimately, humanity.

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Appendix A

Institution	How is this institution addressing university air travel?	Policy Names
Arizona State University	• Funds ASU Carbon Project through a mandatory $10 fee for all round-trip air travel	Carbon Project (n.d.)
Auburn University	• "Improve tracking of funded travel for mileage & associated emissions & evaluation of reduction potential."	Climate Action Plan V.1.1 (2019)
Clemson University	• "Ideas in need of a champion: 'Implement a University-wide sustainable travel policy to encompass students, faculty, staff and administration'" (p. 19, Sustainability Action Plan).	Sustainability Action Plan (2011)
College of William and Mary	• Goal to begin offsetting emissions from all student travel and business air travel.	Sustainability Plan (2018)
Duke	• Extensive discussion of the benefits and drawbacks of reduce business air travel. • Recommends developing air travel policies and better tracking of data/	Climate Action Plan (2009) Climate Action Plan Update (2019)
Florida State University	• No mention	Strategic Plan (2016)
Georgia Institute of Technology	• Goal to develop carbon offset program for work-related travel by 2030.	Strategic Plan for Sustainable Practice (2020)
Iowa State University	• No mention	Campus Sustainability Report (2019) 2021-2025 Strategic Plan for Sustainability in

		Operations (2021)
Louisiana State University	• No mention	Comprehensive and Strategic Master Plan (2017)
Michigan State University	• No mention	Energy Transition Plan (2012)
North Carolina State University	• No mention	Sustainability Strategic Plan (2017)
The Ohio State University--Columbus	• Advance and promote teleconferencing and remote meetings. • Develop a university air travel policy to offset related emissions.	Path to Carbon Neutrality: Ohio State Climate Action Plan (2020)
Oregon State University	• Created a voluntary carbon offset program for all OSU-funded travel	Strategic Plan 4.0: Transformation, Excellence, and Impact (2019) Carbon Offsets for OSU Funded Travel (n.d.)
Pennsylvania State University-University Park	• No mention	None found
Purdue University	• No mention	Physical Facilities Sustainability Master Plan (2020)
Rutgers University--New Brunswick	• Recommend promoting more online communication, regional conference attendance, carbon offsets purchasing program, better tracking, and capping university-sponsored travel.	Developing Pathways toward a Carbon Neutral, Climate Resilient Rutgers, (2020)

		Note: interim report
Stanford	• Developed GHGE growth projections that included air travel, which was expected to increase without efforts • Reported that air travel data is incomplete • Considered air travel offsets as low-cost strategy. • Has created a carbon offset program to offset athletics travel.	Energy and Climate Plan (2013, 2015; n.d.) SCORE (n.d.)
University of Alabama	• Suggests retail offsets to mitigate air travel GHGE • Suggests "Green Fee" for air travel	Sightlines Report (2017)
University of California-Berkeley	• Implement a pilot offset program that funds local projects that reduce GHGE. • Promote video conferencing • Promote the use of direct flights, sustainable airlines, driving, or rail	UC Berkeley Sustainability Plan (2020)
University of California-San Diego	• Recommended increased video conferencing, behavior changes, and offsets.	UC San Diego Climate Action Plan (2019)
University of California-Davis	• Issues tracking and accessing air travel data. • Recommended reducing travel through teleconferencing.	Climate Action Plan (2010)
University of California-Irvine	• Recommends establishing offsets for university-sponsored travel.	Climate Action Plan 2016 Update (2016)
University of California-Los Angeles	• UCLA will implement a pilot program to collect fees based on tier of travel (California, domestic, international) and will use fees for local GHGE mitigation projects.	UCLA Carbon Neutrality Plan (2016) UCLA Air Travel Mitigation Fund Guidelines (2021)

University of California-Santa Barbara	• Issues tracking and accessing air travel data. • Recognizes need for reduced business air travel; teleconferencing. • Recommends outreach about how travel increases university GHGE profile, reduction incentivization, and making travel-related offsets part of grant requirements. • A faculty member developed and implemented a "nearly-carbon neutral conference" model, which the university supports.	Climate Action Plan (2016)
University of Connecticut	• No mention	2020 Vision for Campus Sustainability & Climate Leadership (2020)
University of Florida	• Recommended establishing a policy to offset travel, including sports travel. • Did not track air travel and air travel-related emissions.	Climate Action Plan V1.0 (2009) Note: under revision
University of Georgia	• Near Term Goal: Encourage teleconferencing as well as driving instead of flying when travel is within 6 hours. • Mid Term Goal: Develop local emissions offset program; incentivize and facilitate offset purchases for faculty, staff, and student air travel.	Campus Sustainability Plan (2015)
University of Illinois-Urbana-Champaign	• Will annually survey “campus personnel regarding the reason, regularity, and urgency with which they travel by plane…to identify opportunities for alternative methods of transportations…and teleconferencing” (p. 75-76). • Will assess and determine investment in technology for teleconferencing. • Currently offers a guide to carbon offsets for faculty and staff air travel. • Hope to develop a carbon offset program that funds local tree planting	Illinois Climate Action Plan (2020)
University of Kentucky	• Recommends a "Business air miles emissions offset"	Emissions Reduction Plan (2018)
University of Maryland-College Park	• Plans to offset 100% of travel (business, study abroad, athletics) and is currently developing an implementation plan for this Carbon Neutral Air Travel Initiative.	Climate Action Plan 2.0 (2021) Carbon Neutral Air Travel Initiative (2017) Carbon Neutrality Dashboard (n.d.)

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University of Massachusetts--Amherst	• Issues tracking and accessing air travel data. (CAP, 2009) • No further mention (CAP 2.0, 2012;)	Climate Action Plan 2.0 (2012)
University of Michigan--Ann Arbor	• Commission on Carbon Neutrality University Travel Team currently researching this issue via surveys and data analysis. • Expect to suggest an offset program and better tracking system. • "Significant accounting uncertainty" for Scope 3 emissions • Promote video conferencing	President's Commission on Carbon Neutrality (2021)
University of Minnesota	• Issues tracking and accessing air travel data.	Climate Action Plan V1.1 (2011)
University of Missouri	• No mention	Leaders in Stewardship (2016)
University of Nebraska-Lincoln	• No mention	Environment, Sustainability, and Resilience Master Plan (2020) Note: draft
University of North Carolina--Chapel Hill	• Recommended improving teleconferencing facilities to decrease air travel	Climate Action Plan Update (2010)
University of Pittsburgh	• No mention	Pitt Sustainability Plan (2018)
University of South Carolina	• No mention	None found
University of Tennessee, Knoxville.	• Recognized as policy opportunity: ""Require departments to purchase carbon offsets for all UT-sponsored air travel" (p. 14, Sustainability Master Plan) • Suggestions for travel reduction in Faculty and Admin Sustainability Playbook	Climate Action Plan (2010) Sustainability Master Plan(2020)

University of Texas--Austin	• No mention	Sustainability Master Plan Update (2018)
University of Virginia	• No mention	Sustainability Plan (2016) UVA Greenhouse Gas Action Plan (2019)
University of Washington	• Suggests reducing travel-related GHGE through behavior changes and offsets. • Recommends supporting videoconferencing facilities.	Climate Action Plan (2009, 2010) University of Washington Air Travel (2016)
University of Wisconsin--Madison	• Issues tracking and accessing air travel data.	Sustainability Initiative Task Force Final Report (2010)Sustainability Report (2018)
Virginia Tech	• No mention	Virginia Tech Sustainability Plan: 2014 Update and Supplement (2014)

Appendix B

Summary table of institutions with offset programs

Institution	Offset Sources	Cost	Effect	Source

Arizona State University	• Third-party offsets
	• Local projects:
	  ○ ASU West campus Carbon sink (1,000 trees)
	  ○ Phoenix and Tempe urban forestry (662 trees)
		$12 per round-trip ASU-sponsored air travel	Funded offsets equivalent to 50,000 tons of CO_2	Sustainability Operations (2020)

Duke	In partnership with Delta Airlines in 2017, planted 1,000 trees to offset all Duke travel on Delta	N/A	5,000 metric tons of CO_2	Delta News Hub (2018)

Oregon State University	• Third-party offsets
	• Local projects:
	  ○ Winston Creek (forest management)
	  ○ Dairy Farm BioFactory (anerobic digester)
		N/A	N/A	Carbon Offsets for OSU-Funded Travel (n.d.)

Stanford (athletics-related travel)	Third party offsets	N/A	Offset all 2015 varsity team travel (2,640 metric tons of CO_2)	SCORE (n.d.)
University of California – Los Angeles	Campus-based energy efficiency and renewable energy projects	$9 for domestic round trip $25 for international rout trip		Air Travel Mitigation Fund Program Guidelines (2021)
University of Maryland	Third-party offsets	$0.0027/mile flown	Offset all directly-financed and study abroad travel (145,664 metric tons CO_2 from 2017-2019)	Carbon Neutral Air Travel Initiative Implementation Plan (2017) Carbon Neutrality Progress Hub (n.d.)