Attitudes toward professional air travel at ETH Zurich, 2020

Report

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Transdisciplinary Lab &
Air Travel Project
"Stay grounded, keep connected"

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1. Introduction: “Stay grounded, keep connected”

In 2017, ETH Zurich launched a project with the goal of reducing the emission of greenhouse gases caused by the university’s business and study-related air travel. This decision by the ETH Executive Board was primarily motivated by the raising awareness for the global climate issue after the Paris climate agreement in 2015. The launch of the project was supported by media attention as well as students, who requested that ETH Zurich address its air travel related emissions, which at the time made up about half of the university’s total emissions. Air travel related emissions at ETH Zurich had been stagnating per full-time equivalent, and growing in absolute numbers, for a decade despite the university’s efforts to reduce greenhouse gas emissions. In the context of rising atmospheric CO_2 concentration and growing public concern about climate change, this lack of emission reductions in the area of air travel was criticized as going against ETH Zurich’s commitment to sustainability.

Because previous attempts to reduce air travel related emissions purely by top-down intervention, or alternatively by non-binding awareness raising activities, the ETH air travel project, which later became known under the claim “Stay grounded, keep connected”, was designed to combine top-down requirements by the Executive Board with bottom-up participation of all departments and administrative units at ETH Zurich. The project was designed and is managed by a project lead working in the staff of the vice president for infrastructure at ETH Zurich.

In order to improve existing data about the volume of CO_2 emitted by air travel at ETH Zurich, a new monitoring system was set up, which now tracks all flights undertaken by ETH staff and faculty for professional reasons, as well as students who travel as part of their curriculum, and invited guests whose travel is paid for by ETH Zurich. The period between 2016 and 2018 was defined as the baseline period against which reduction goals were to be set. Reduction goals were defined by each department and administrative unit individually, in order to accommodate the differences in culture and profiles as well as to maintain autonomy. The manner in which these goals were constructed was left to each unit, although guidance was provided by the project lead in the form of workshops and information material. The reduction goals, which fall in the range of 3%-20% and are to be achieved by 2025, describe the effective reduction of CO_2 equivalents attributable to behavior change of ETH members, excluding carbon offsetting as well as efficiency gains on the part of the aviation industry.

Over the course of the project’s development, the climate impact of air travel has gained traction as a topic for debate internationally as well as nationally. This applies also to travel habits in the academic sector, which are increasingly criticized. The measures ETH Zurich has taken to address this issue in its own backyard have received attention from a growing number of universities worldwide wishing to join the effort.

This report summarizes the results of two surveys that were carried out in the context of the doctorate research of Agnes Kreil.

2. Survey background and political context

The survey method was chosen for its ability to solicit data from a large number and great diversity of individuals within ETH Zurich, thus complementing more narrow data sources previously analyzed in the course of the doctoral research. The surveys aimed to generate material of scientific interest for the doctoral thesis of Agnes Kreil, as well as feedback with practical significance for ETH Zurich as a whole, in particular the departments, the Executive Board and the project lead about how the project “Stay grounded – keep connected” was being received within ETH Zurich, and which concerns ETH members had in relation to it.

The ***first survey***, distributed among professors of ETH Zurich, was conducted between 24 February and 19 March 2020. The ***second survey***, which contained many of the same questions as well as a few additions and adaptations, was distributed to non-professorial scientific staff of ETH Zurich, and conducted between 6 and 20 November 2020. The surveys were therefore conducted approximately three years after the inception of the air travel project, and in the second year of the doctorate research analyzing it.

Unexpectedly, a major event occurred in between the two surveys: On 11 March, the World Health Organization proclaimed the COVID-19 pandemic. Only four more responses to the first survey were collected after this date. While the virus had already emerged in late 2019, public concern in Switzerland about the country being directly affected was still very limited at the time when most of the responses to the first survey were collected (24-29 February 2020). There was no reference to the pandemic in the first survey, and no discernible trend in the data over the runtime of the survey. In contrast, at the time of the second survey, the pandemic had been a prominent matter of concern in Switzerland as well as internationally for many months, with drastic impacts on travel patterns by way of travel restrictions and restrictions on physical meetings. Expecting an impact of this situation on the survey responses, an open-ended question related to the pandemic was included in the second survey.

It should also be noted that both surveys were conducted in a time period following more than a year (at the time of the first survey) of public environmental protest in Switzerland and many other countries, organized by the grass-roots organization Fridays for Future (Swiss name: Klimastreik). Among many other topics, air travel – predominantly in the form of tourism – received considerable criticism by this movement, and was discussed repeatedly in mainstream media during this time, which may have impacted attitudes toward professional air travel at ETH Zurich.

3. Methods

3.1. First survey

The first survey was set up as an online questionnaire, which took roughly 10 minutes to complete. It was completely anonymous, voluntary, and not incentivized in any way. It was emailed to all 678 faculty members with professorial titles who were employed by ETH Zurich at that time.

The full text of the first survey is attached to this report. In short, it contained the following closed questions:

- demographic information about employment level and organizational unit
- knowledge and approval of the air travel project
- perceived importance of air travel reduction in academia
- frequency of air travel as a topic of conversation with colleagues or students
- impact of the air travel project on personal air travel behavior
- willingness to change personal air travel behavior
- agreement with a selection of pre-identified arguments
- agreement with a selection of pre-identified conclusions to certain arguments

It contained the following open questions:

- approval of the air travel project
- perceived importance of air travel reduction in academia
- arguments about whether or not ETH Zurich should reduce air travel related emissions
- conclusions to certain pre-identified arguments

3.2. Second survey

The second survey was also set up as an online questionnaire, also took roughly 10 minutes to complete, and was also anonymous, voluntary, and not incentivized in any way. It was distributed via e-mail to 8323 scientific staff members at ETH Zurich by the Association of Scientific Staff at ETH (AVETH).

The second survey contained many of the same questions as the first, but was adapted by Agnes Kreil in collaboration with AVETH to suit the target group and reflect the changed political context during the COVID-19 pandemic.

The full text of the second survey is attached to this report. In short, it contained the following closed questions:

- demographic information about employment level, organizational unit, and membership in AVETH
- pre-pandemic air travel and virtual travel habits
- perceived importance of air travel for one’s academic work
- knowledge and sources of knowledge about the air travel project
- approval of the air travel project
- appropriate reduction measures of the air travel project

- perceived importance of air travel reduction in academia
- impact of the air travel project on personal air travel behavior
- willingness to change personal air travel behavior
- personal worries related to reduced professional air travel

It contained the following open questions:
- approval of the air travel project
- appropriate reduction target for the air travel project
- appropriate reduction measures for the air travel project
- perceived importance of air travel reduction in academia
- previous or intended reduction of one's own air travel
- impact of COVID-19 on one's attitude toward professional air travel
- open comment

3.3. Treatment of significance tests

Most analyses in this report were performed without guiding hypotheses. The interpretation of significance tests in the usual way (as rejection of, or failure to reject, a null hypothesis), is therefore problematic. In particular, as a large number of tests were run in the making of this report, appropriately interpreting significant test results as evidence that the null hypothesis should be rejected would require drastic alpha-level corrections to the point where all analyses would be severely underpowered.

For that reason, this report mostly relies on descriptive analyses. Effect sizes, or the information necessary to compute them, are reported in order to facilitate future hypothesis-guided research. However, significance tests are reported throughout this document wherever differences in means between two or more groups are difficult to gauge through visual and descriptive analysis, for example due to the confounding influence of department membership. In these cases, the test helps to describe patterns observed in the data.

4. Samples

This report combines and compares results concerning several different samples. Sample A is made up of professors who participated in the first survey. Sample B is made up of non-professorial scientific staff members who participated in the second survey. Samples C and D are made up of students and professors, respectively, who participated in the second survey although they were not the main target group. They were excluded from all analyses in this report except where explicitly mentioned in the respective subsections.

It should be noted that due to differing sampling strategies, Sample A and Sample B overlap in their target groups in that both include titular professors, who are in Sample A counted among the professors, in Sample B among the scientific staff. This introduces a challenge in comparing the two groups, perhaps masking some potential differences.

Department	Sample A	Sample B	Sample C
	Responses (% of Sample A)	Responses (% of Sample B)	Responses (% of Sample C)
Other	0 (0%)	2 (0.4%)	0 (0%)
Unknown	4 (2.3%)	148 (31.3%)	13 (20.6%)
A	7 (4.0%)	16 (3.4%)	1 (1.6%)
B	4 (2.3%)	9 (1.9%)	1 (1.6%)
C	8 (4.5%)	17 (3.6%)	1 (1.6%)
D	6 (3.4%)	20 (4.2%)	4 (6.3%)
E	7 (4.0%)	16 (3.4%)	0 (0%)
F	18 (10.2%)	34 (7.2%)	6 (9.5%)
G	7 (4.0%)	15 (3.2%)	2 (3.2%)
H	6 (3.4%)	22 (4.7%)	4 (6.3%)
J	10 (5.7%)	15 (3.2%)	3 (4.8%)
K	13 (7.4%)	15 (3.2%)	3 (4.8%)
L	11 (6.3%)	12 (2.5%)	6 (9.5%)
M	13 (7.4%)	23 (4.9%)	6 (9.5%)
N	9 (5.1%)	19 (4.0%)	1 (1.6%)
O	11 (6.3%)	22 (4.7%)	4 (6.3%)
P	19 (10.8%)	22 (4.7%)	3 (4.8%)
Q	23 (13.1%)	46 (9.7%)	5 (7.9%)

Table 1. Responses by department for Sample A (professors, first survey), Sample B (scientific staff, second survey), and Sample C (students, second survey).

4.1. Sample A (Professors, first survey)

Sample A is made up of 176 employees of ETH Zurich with a professorial title who participated in the first survey. Only members with professorial titles were contacted for this survey, and although it was explicitly permitted to forward the survey link to other members of ETH Zurich, there do not appear to be non-professorial participants in this sample. 152 participants (86%) indicate that they are Full/associate/assistant professors. 20 (11%) say they are titular professors. 4 (2%) prefer not to provide information about their position.

The response rate of 26% is remarkably high considering the high work load of the targeted demographic and the absence of incentives. The absolute and relative response rates vary significantly between departments, as does the share of total responses attributed to each department. However, every department of ETH Zurich is represented in the dataset, along with a few participants from central organizational units.

4.2. Sample B (Scientific staff, second survey)

Sample B is made up of 473 scientific staff members employed at ETH Zurich who participated in the second survey. Table 2 displays the employment categories of the participants. Note that “postdoc” will hereafter be used as an umbrella term describing all individuals in the category “Postdoc & Wissenschaftliche*r Assistant*in II”; similarly “Oberassistent*in” will be used as shorthand for all individuals in the category “Oberassistent*in I+II & Wissenschaftliche*r Mitarbeiter*in”, and “senior scientist” may sometimes be used as shorthand for all individuals in the category “Senior scientist (Höhere wissenschaftliche Mitarbeiter*in) & Titulary Professor”.

Although the survey link was sent out to all scientific staff members at ETH Zurich, the fact that it was sent by the president of AVETH, the association of the scientific staff, may have led to a bias favoring AVETH members. 229 participants (48%) indicate that they are members, 114 (24%) that they are not, 117 (25%) that they don’t know, 4 (< 1%) prefer not to say, and 9 (2%) skipped the question entirely.

Although only members of the scientific staff were contacted for the second survey, it was explicitly permitted to forward the survey link to other members of ETH Zurich. Due to this, 63 students, 23 professors, and 1 technical or administrative staff member also responded. They were excluded from Sample B and instead form Sample C (students) and Sample D (professors). The single technical or administrative staff member was excluded from this report.

Thus excluding groups which were not originally contacted for the purpose of the survey, the response rate is only 5.7%, far lower than in the first survey.

Further, 13 participants in the second study do not provide information about their position at all. These were included in Sample B as scientific staff based on the assumption that if they had received an invitation to the survey, the most likely label for them would be scientific staff.

Employment category	Responses (% of Sample B)
Doctoral student	269 (56.9%)
Postdoc & Wissenschaftliche*r Assistent*in II	95 (20.1%)
Oberassistent*in I+II & Wissenschaftliche*r Mitarbeiter*in	65 (13.7%)
Senior scientist (Höhere wissenschaftliche Mitarbeiter*in) & Titulary Professor	34 (7.2%)
Other	5 (1.1%)
Prefer not to say	3 (< 1%)
No reponse	13 (2.7%)

Table 2. Employment categories in Sample B. Those in the category “other” name their positions as scientific assistant I, research assistant, lecturer, and intern.

4.3. Sample C (Students, second survey)

Sample C consists of the 63 students who participated in the second survey despite not being specifically contacted for it. It is likely that these students received the survey link from scientific staff members whom they work with or know personally, and thus represent a particular subgroup of the student population rather than the student population as a whole. It is also likely that the students, who were not specifically asked to participate in the survey in the email text, may have had a special motivation to participate, such as a special interest or investment in the topic of air travel emissions, or in the ETH Zurich air travel project.

4.4. Sample D (Professors, second survey)

Sample D consists of the 23 professors who participated in the second survey despite not being originally contacted for it. Because they are so few, and suffer from the same heightened risk of self-selection bias as explained above for Sample C, they are not included in this report except in section 5.1.1.

5. Results

Please note that as with any data collection based on voluntary participation, there may be a bias in both samples caused by self-selection. For example, people with favorable attitudes toward the air travel project, or people who were knowledgeable about the project, may be more likely to respond. In order to counter a possible knowledge bias, the e-mail text sent along with the survey links, as well as the information provided on the first page of the survey, was deliberately written to emphasize that no prior knowledge of the project was required for survey participation, and that a diversity of opinions was sought. While an opinion bias is possible, it is more likely to be in favor of people with strong opinions about the air travel project, whether positive or negative, than only in favor of people with strong positive opinions, as it is expected that people with strong negative opinions would also be motivated to have their feedback relayed to the project lead.

5.1. Impact of COVID-19

5.1.1. Comparing Sample A and Sample D

When comparing Sample A (professors, first survey) and Sample B (scientific staff, second survey), it is difficult to attribute differences to a specific cause, because the samples differ both in their demographics as well as time-wise: The second survey may have been affected by the COVID-19 pandemic. Because a number of professors participated in the second survey despite not being contacted for it, it is possible to compare these (Sample D) to the professors from the first survey (Sample A) in order to estimate the COVID-19 related differences. However, because Sample D is much smaller than Sample A, making statistical comparison difficult, only large differences could be identified in this way.

The samples A and D were compared on two key questions (both of which are explored in more depth in other sections of this report): Their approval of the ETH air travel project, and the importance they assigned to the issue of air travel reduction in academia. The related statistical analyses are reported in Appendix A.

Descriptively, a small drop over time of less than half a scale point can be observed for both dependent variables, but no statistically significant differences were detected between the samples on either of the two dependent variables investigated. However, given the small sample size and non-normal distribution of the dependent variables, the power of both significance tests is low and a small effect of the size observed would likely not have been detected by the tests. It is therefore possible despite the non-significant tests that a time-bound difference exists between the professors who participated in the first and second survey.

Such a difference might have been caused by the COVID-19 pandemic, but alternatively could be due to longer exposure to the air travel project, or could be a product of selection bias if professors who do not perceive the topic as very important and did not approve of the project very much were more likely than others to wait until the second survey to respond. Except for the last case, which would be limited to professors, these possible confounding influences form an important caveat to keep in mind when interpreting the results presented in this report.

5.1.2. Open-ended question about the impact of COVID-19 (Sample B)

In the second survey, participants were asked the open-ended question “Has COVID-19 changed your views on the issue of greenhouse gas emissions from professional air travel at universities in any way?” Many simply respond that there was no change, but many others do describe an impact, with virtual communication clearly being the central theme.

One group says that COVID-19 had a favorable impact, by illustrating that virtual communication is possible and that some travel can be replaced in that way. Another group says that COVID-19 had a negative impact, by demonstrating the shortcomings of virtual communication, showing that virtual communication cannot replace in-person meetings and that travel is in fact necessary in academia. While overall there are far more reports of improved than deteriorated attitudes toward virtual communication and travelling less, it seems that these two camps of people are experiencing the academic sector’s adaptation to the pandemic very differently. Both trends are reported both by people who say that COVID-19 strengthened their pre-existing beliefs about this issue, and people who say that COVID-19 changed their mind.

Often, a somewhat mixed perspective is put forth, typically that virtual communication is an effective tool for certain tasks (such as presentations and certain kinds of meetings), but not for others (networking in particular is emphasized). The explicit or implicit conclusion is usually that travel should be maintained for those purposes which cannot be fulfilled using virtual communication. Experiences of the shortcomings of virtual communication technology are used as a basis not only for rejecting the idea of reduced air travel, but often also for pin-pointing specific challenges and suggesting solutions to improve virtual communication in the future. It is also repeatedly pointed out that the pandemic changed not simply minds, but the conditions under which behavior takes place: during the pandemic there are more virtual opportunities, virtual communication became socially acceptable (and in fact obligatory much of the time), people improved their virtual communication knowledge and skills and the technology was improved. All of this makes it easier not to fly if one doesn’t want to, as opposed to previous structures that demanded travel independently of people’s personal attitudes. Several participants express the hope or expectation that these changes would carry over into the future.

5.1.3. Summary

It appears that the COVID-19 pandemic has had both favorable and negative effects for the reduction of air travel in academia. Although the qualitative data yield more reports of the pandemic improving people’s attitudes toward air travel reduction than deteriorating them, the quantitative data indicate, if anything, a small decline of approval for the ETH Zurich air travel project over time, as well as a small decline in the perceived importance of the topic of air travel emissions in academia. The data is therefore ultimately inconclusive on this question.

5.2. Air travel related emissions as a topic

5.2.1. Perceived importance of the topic[1] (Samples A, B, C)

Figure 1 displays the distribution of responses given by participants in Sample A (professors, first survey), Sample B (scientific staff, second survey), and Sample C (students, second survey), respectively, when asked how important they consider the issue of air travel related greenhouse gas emissions at universities. The large majority of participants in all groups indicate that this is an important topic. While interpretation of this result should take into account the possible bias resulting from the self-selection of participants, this finding indicates that this is a timely issue to address for ETH Zurich.

Perceived issue importance varies considerably between the departments of ETH Zurich (Figure 2). Visual inspection suggests that perceived issue importance differs between professors and scientific staff in some departments, with professors usually less supportive of the project than scientific staff (Figure 2). However, this difference between Sample A (n = 172, Ø = 3.808, SD = 1.201) and Sample B (n = 464, Ø = 3.980, SD = 1.180) is not statistically significant when testing across all departments (including participants who do not state their department membership, but excluding participants who selected “other” due to small subsample size and questionable comparability) with a two-tailed t-test[2], $t(630) = -1.379$, $p = .168$. Neither was it detected by an ANOVA correcting for the influence of interdepartmental differences by including both Sample and department membership as fixed factors, $F(1, 616) = 1{,}818$, $p = .178$. Therefore it can’t be concluded that different seniority levels perceive the importance of greenhouse gas emissions associated with academic air travel differently across ETH Zürich.

Similarly, when Sample B is broken down further into employment categories, no clear pattern emerges for perceived issue importance (Figure 3). Although the students in the sample rate the importance of the issue particularly high, it is important to keep in mind that the students were not specifically recruited for the survey, resulting in possible sampling bias (see section 4.3). A separate survey targeting students could illuminate this.

[1] Both surveys included very similar questions and response options. The first survey asked “How important do you consider the issue of greenhouse gas emissions from professional air travel at universities?”, the second asked “How important or unimportant do you consider the issue of greenhouse gas emissions from professional air travel at universities to be?” Answer option “Can’t say” from the first survey was again rephrased as “Don’t know” in the second survey, and again, the second survey, unlike the first, allowed participants to skip the question.

[2] The sample size was here considered sufficient to make the t-test robust to the skewed dependent variable. For the ANOVA, the case is less clear given the many groups created by the 16 departments; however, ANOVA has the ability to include department membership in its model. For that reason, the results of both tests are reported.

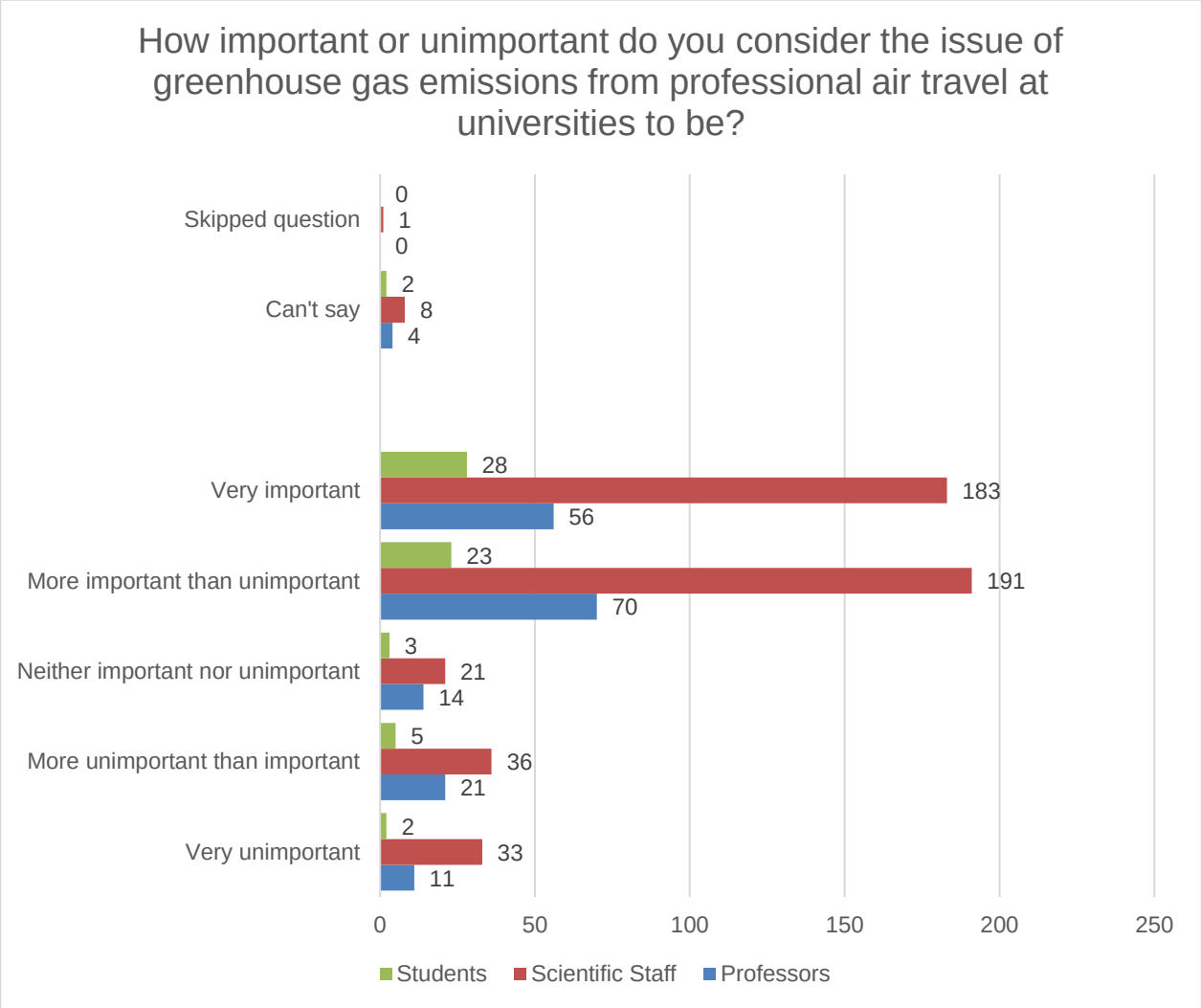

Figure 1. Perceived issue importance in Sample A (professors, first survey), Sample B (scientific staff, second survey), and Sample C (students, second survey).

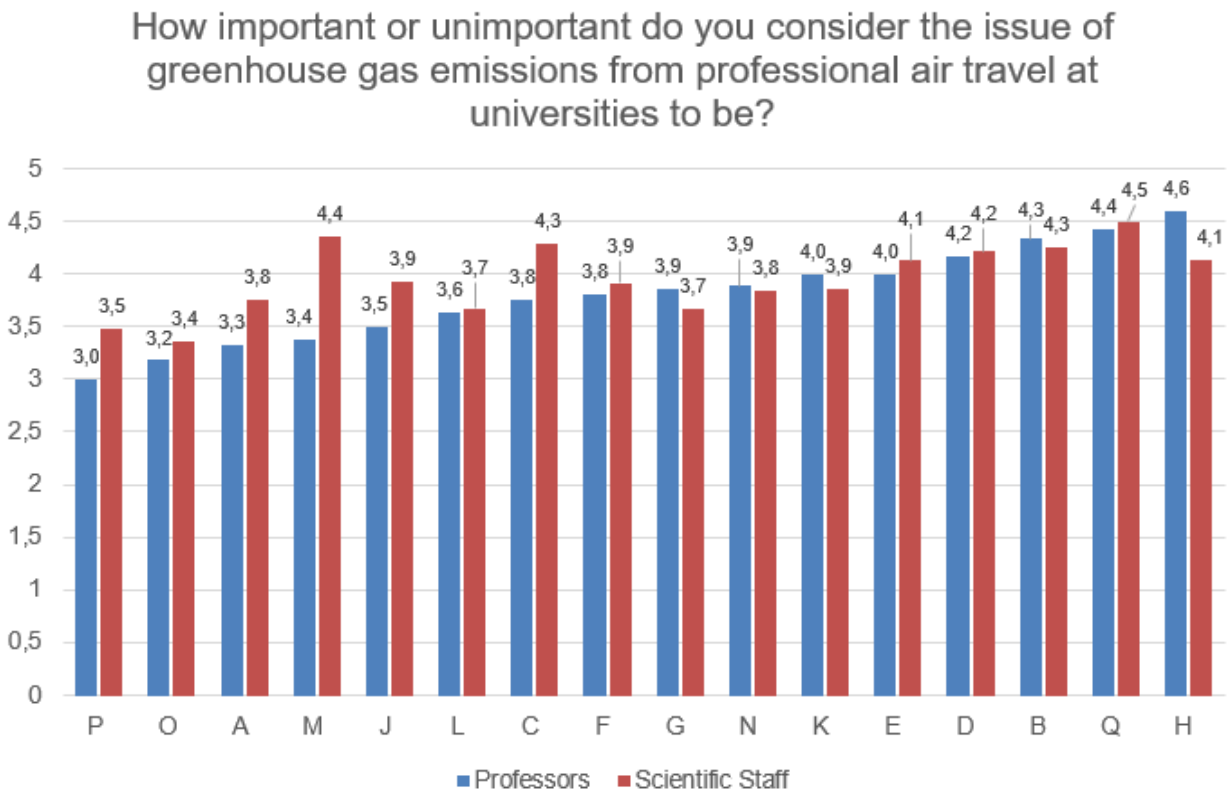

Figure 2. Average importance ratings among professors (Sample A, first survey, n = 168) and scientific staff (Sample B, second survey, n = 317) for each departmentNotably, the 145 scientific staff who do not state their department membership have a mean score of 3.93, while the 4 professors who say they prefer not to state their department membership score only 2.75 on average. Note that the displayed values may be distorted for some departments with a small number of participants.

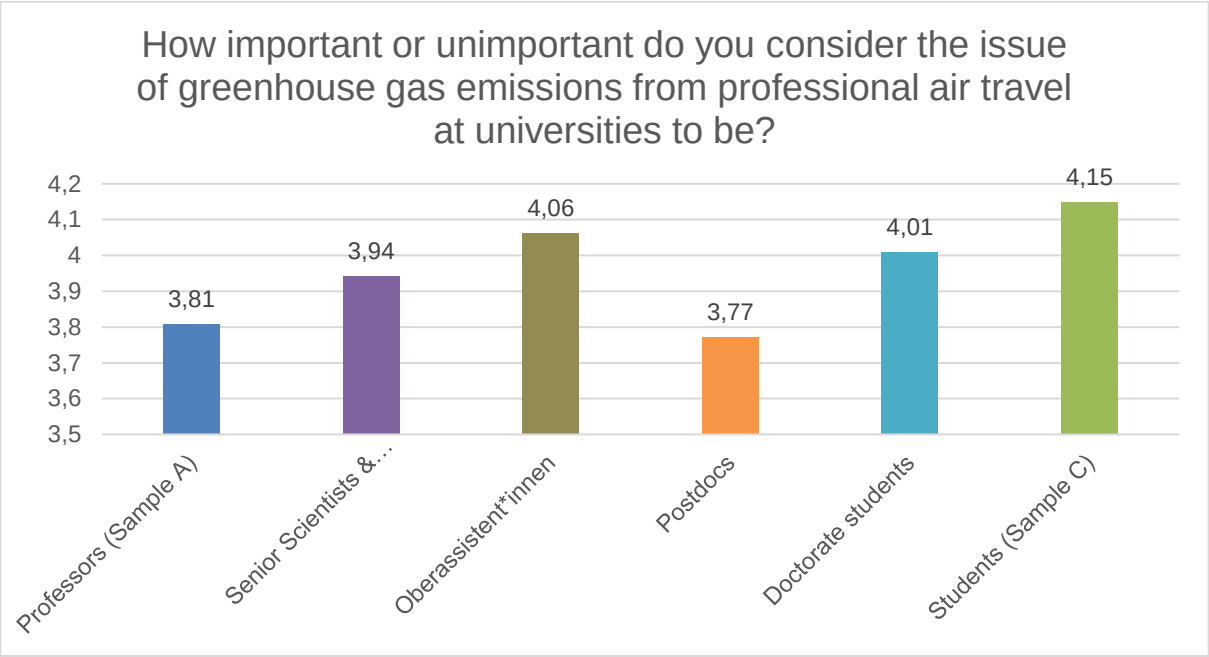

Figure 3. Average perceived importance of the issue of greenhouse gas emissions caused by academic air travel, combining Samples A, B, and C. Senior scientists and titular professors (n = 34), Oberassistent*innen (n = 65), postdocs (n = 92), and doctorate students (n = 263) are all drawn from Sample B. Professors (n = 172) are drawn only from Sample A, students from Sample C (n = 61).

5.2.2. Prevalence in conversation (Sample A)

In the first study only, participants were asked how often they had discussed the issue of greenhouse gas emissions from academic air travel, and/or the ETH Zurich air travel project, with others at ETH Zurich during the past two months. Most report that they did talk about this, most often 1-2 times (Figure 4). Once again, there are remarkable differences between departments (Figure 5): On one end of the spectrum, in some departments up to 54% of respondents indicate that they did not speak about the topic at all, opposed to 0% of respondents from another department. This shows that the debate about air travel, as well as the ETH air travel project, is not occurring evenly across the different departments.

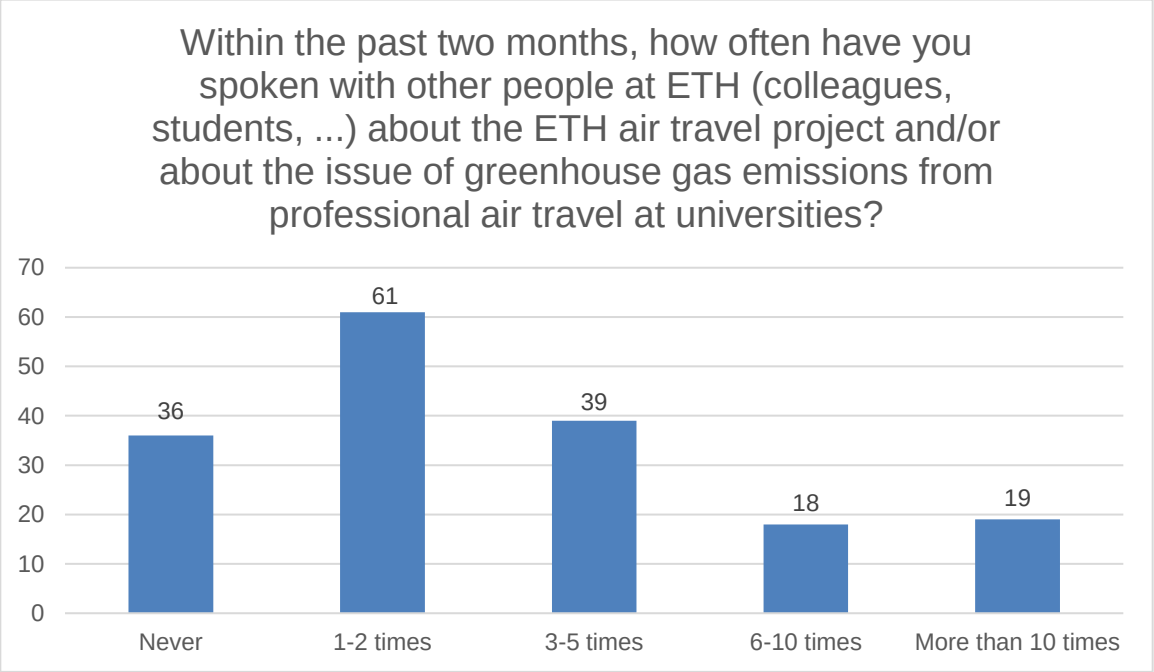

Figure 4. Conversation frequency in Sample A (professors, first survey). n = 173. One participant preferred not to answer the question, two participants can't say.

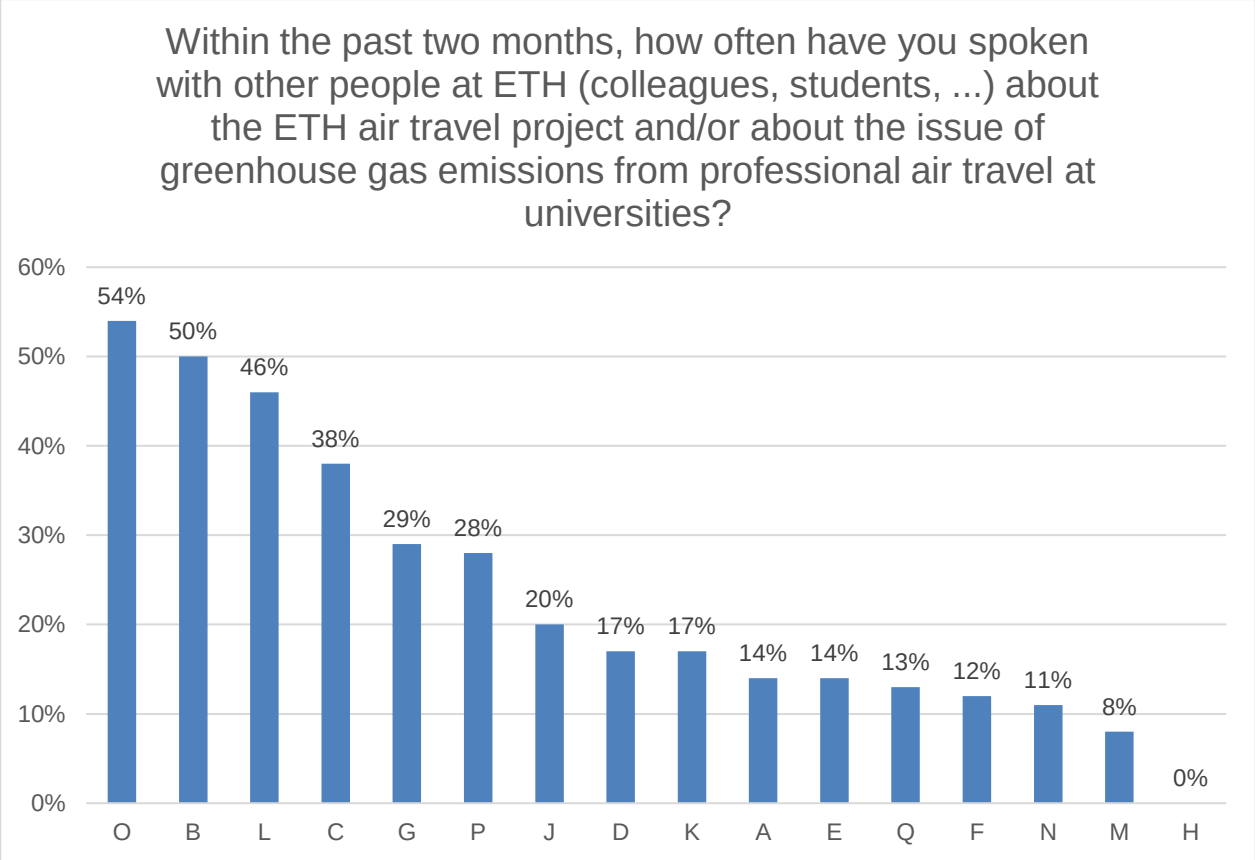

Figure 5. Percentage of professors (Sample A, first survey) from each department who say they did not speak about emissions associated with academic air travel or about the ETH air travel project to another person at ETH Zurich within the past two months prior to participating in the survey. Participants who did not answer the question ("prefer not to say", "can't say") are included in the total.

5.2.3. Arguments for and against reducing professional air travel (Sample A)

Prior to the surveys, case study research had been conducted by Agnes Kreil in the course of her doctorate project, seeking to chart the content and structure of the air travel debate at ETH Zurich. Over a period of a year and a half, diverse data sources had been collected and analyzed in relation to this debate, and various arguments about the reasons, necessity, consequences, risks, and meaning of air travel in academic work had been isolated.

Among other aims, the first survey was designed to quantify levels of agreement with each argument; to test whether the arguments had been reconstructed appropriately; and to give all professorial faculty at ETH Zurich a chance to add arguments which had so far been overlooked, thereby simultaneously checking and improving the completeness of the analysis.

These arguments presented by members of ETH Zurich about whether or not professional academic air travel should be reduced, as well as levels of agreement with each argument among professors according to this survey, are the focus of a scholarly article written by Agnes S. Kreil, entitled “Does Flying Less Harm Academic Work? Arguments and Assumptions about Reducing Air Travel in Academia”, which is currently under review. Publisher regulation does not permit secondary publication of these results in this report at this time. Interested readers are therefore encouraged to consult the forthcoming journal article, request a copy of the article from agnes.kreil@usys.ethz.ch, or refer to the preprint of the article, which may be made available on the website of the ETH air travel project upon publication.

5.2.4. Summary

The majority of participants consider air travel related greenhouse gas emissions in academia an important topic, with some difference between departments, and possible divergence between professors and scientific staff in some, but not all, departments. While only a minority report not having discussed the topic with others at ETH Zurich within the two weeks prior to participating in the survey, indicating that it is a frequent topic of conversation within the institution, this debate seems to be occurring very unevenly across the departments.

5.3. Reception of the ETH Zurich air travel project

5.3.1. Familiarity with the project[3] (Samples A, B, C)

Among the professors polled in the first survey (Sample A), 162 (92% of Sample A total) had heard of the ETH Zurich air travel project already. While this is a good result for the project, there seem to be large differences between the departments: While all participants from some departments are familiar with the project, in two other departments as many as 38% and 50%, respectively, do *not* know about it. This may be a statistical artifact owing to the small number of participants from these departments, but may also hint at a need for the air travel project to communicate more intensely with these departments. So far, information about the project has been distributed through specified contact persons, and the heterogeneity of knowledge about the project may indicate that not all departments have made the same efforts to pass on this information to their faculty. If this is the case, interested faculty may not be getting a chance to participate in the debate or to affect the design of the air travel project.

Among the scientific staff polled in the second survey (Sample B), 8 participants in Sample B skipped the question, and 9 say they don't know (neither of these options was available to participants in the first survey). 259 (57% of the participants who gave valid responses to the question, excluding missing and "don't know" responses) had heard of the ETH Zurich air travel project already before the survey. Project knowledge is similarly low in all employment categories within Sample B with the exception of the senior scientists/titular professors, who are re more likely to have heard of the project according to visual inspection (Table 3). Scientific staff, especially more junior members, are therefore less well informed about the air travel project than professors; this pattern is visible in each department (Figure 6). Again, there are large differences between the departments: In some, as many as 75% or 79% of all participants who gave valid answers knew about the project; on the other end of the spectrum are 25% and 33%.

One department in particular shows very high levels of familiarity with the project both in Sample A and Sample B, while another shows very low familiarity levels in both samples, probably indicating different communication strategies in these departments. Familiarity levels of professors and scientific staff in each department are moderately correlated ($r = .379$), but due to the small number of departments ($n = 16$), it is uncertain whether this indicates shared causes for professors' and scientific staff members' project knowledge in different departments, or is merely a statistical artefact.

[3] The question text differed slightly between the two surveys. First survey (Sample A): "Before this survey, have you heard of the ETH air travel project which aims to reduce ETH greenhouse gas emissions?" Second survey (Sample B): "Before this survey, had you heard of the ETH Zurich air travel project ("Stay grounded, keep connected"), which aims to reduce ETH Zurich's greenhouse gas emissions?" It is unlikely that this created a difference between the surveys, as the project in question was clearly defined on the first page of the survey, as well as in the e-mail by which survey respondents were recruited.
Also, the second survey included the answer option "Don't know", which was not included in the first survey, and participants in the second survey also had the option to skip this question. It is unlikely that this created a notable difference between the surveys, as only 9 participants in the second survey (2% of Sample B) chose "Don't know", and 8 participants (2%) skipped the question.

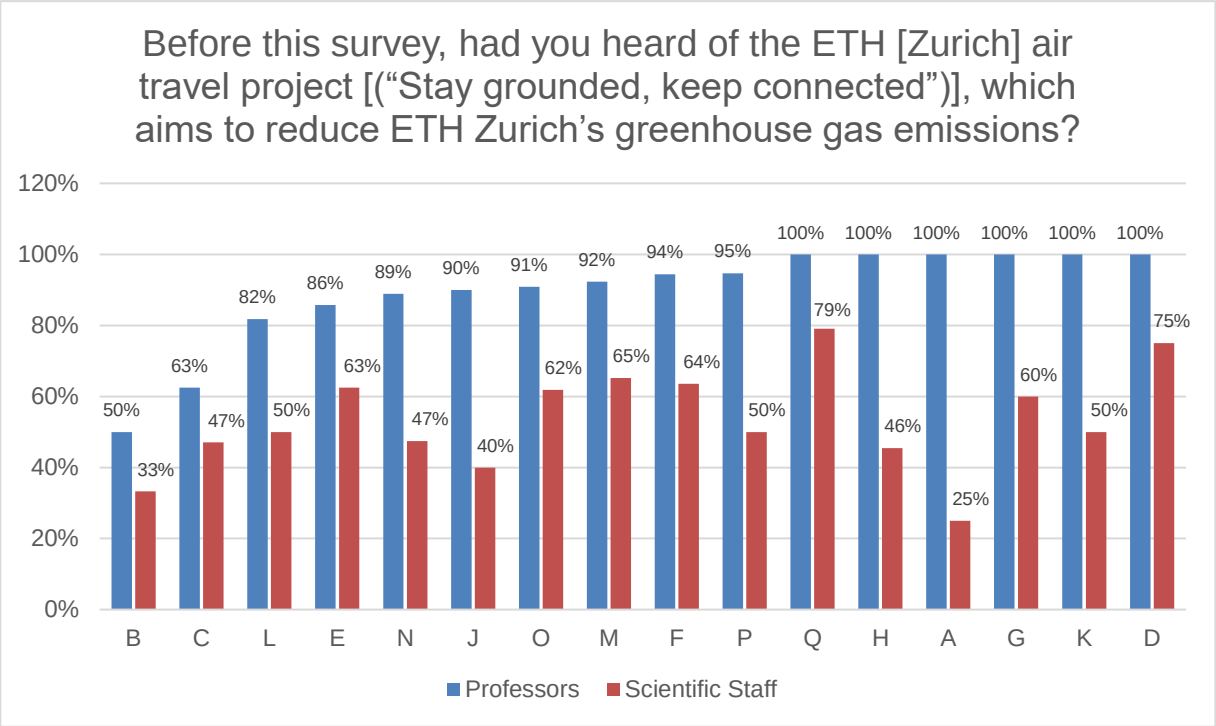

Figure 6. Percentage of participants per department who knew about the ETH Zurich air travel project before the survey (calculated as "Yes" responses divided by "Yes" and "No" answers; "I don't know" and missing responses, which were only allowed in the second survey, are excluded in order to facilitate comparison between the samples), in Sample A (professors, first survey, n = 176) and Sample B (scientific staff, second survey, n = 456). Note that the displayed values may be distorted for some departments with a small number of participants.

Among the students who responded to the second survey unprompted (Sample C), only 15 (24% of Sample C total) had heard of the ETH Zurich air travel project already. This number is more likely to overestimate than underestimate true levels of project knowledge in the student population, because those students who received the survey link from a scientific staff member evidently entertain communication channels with ETH Zurich researchers, and may also have obtained project information in this way. Indeed 5 students (8% of Sample C) say that they learned about the project from a superior or colleague, although the most common source of information among the students, too, is e-mails from ETH or from one's department (5 individuals, 8% of Sample C).

Participants in the first survey (Sample A) were asked also how often they had spoken to others at ETH Zurich about the topic of greenhouse gas emissions from academic air travel, and/or the ETH Zurich air travel project (see section 5.2.2), within the two weeks prior to participating in the survey. Naturally, on an individual level, there is an association between having spoken about

the topic recently and being familiar with the project ($\chi2(1) = 5.479$, $p = .019$, n = 173). On a department level, the percentage of participants from each department who had not spoken about the topic recently, and the percentage of participants from that department who had not previously known about the ETH Zurich air travel project, are also strongly correlated (r = .623, p = .010). However, as above, the small number of departments (n = 16) makes it impossible to tell whether this correlation reflects a true association or is a statistical artifact. A true association would underline the importance of maintaining a conversation about this topic in each department to ensure that knowledge about the project spreads, and is passed on to new department members.

In the second survey (Sample B), those who already knew about the project were asked where they learned about it. Participants could give more than one response. The most frequently named source of information is an e-mail from ETH or one's department (115; 24% of Sample B), followed by being informed by a colleague (61; 13%), one's superior (55; 12%), ETH-internal news outlets (32; 7%), social media of ETH or AVETH (27; 6%), and attending an information event (22; 5%). 24 people (5%) name another source, such as the departmental conference (4), external media (3), and the ETH/project website (3). 22 people (5%) say they don't know.

Employment category	**N (% of employment category)**
Doctoral student	149 (57%)
Postdoc & Wissenschaftliche*r Assistant*in II	53 (56%)
Oberassistent*in I+II & Wissenschaftliche*r Mitarbeiter*in	34 (53%)
Senior scientist (Höhere wissenschaftliche Mitarbeiter*in) & Titulary Professor	24 (71%)

Table 3. Percentage of participants in each employment category within Sample B who say they were already aware of the ETH Zurich air travel project before the survey (calculated as "Yes" responses divided by "Yes" and "No" answers; "I don't know" and missing responses are excluded in order to facilitate comparison with Figure 6).

5.3.2. Project approval[4] (Samples A, B, C)

Average project approval differs between departments (Figure 7), with some departments scoring as high as 4.5 out of 5, while one department in particular scores notably lower than the rest (only 2.74 out of 5).

Figure 8 displays the levels of approval of the ETH Zurich air travel project as indicated by participants in Sample A, Sample B, and Sample C, respectively. The large majority of participants indicate approval of the project. While interpretation of this result should take into account the possible pro-project bias resulting from the self-selection of participants, it is a very positive result for the project.

There is no significant association between having heard of the project before the survey (see section 5.3.1) and project approval, neither in a two-tailed t-test[5] across all departments [$t(583) = 1.016$, $p = .310$] nor in an ANOVA with department membership added as a second independent variable [$F(1, 566) = 1.287$, $p = .257$]. Both of these analyses included participants who did not state their department membership, but excluded those who indicated “other” as their department membership due to small sample size and questionable comparability, thus resulting in a sample of 173 participants previously unfamiliar with the project (Ø = 4.237, SD = 1.049) and 411 participants already familiar with the project (Ø = 4.134, SD = 1.149).

Visual inspection shows that while the distribution of approval ratings is clearly skewed towards high project approval in all samples, this is much more strongly the case for the scientific staff compared to the professors (Figure 8). Accordingly, visual inspection suggests that average approval levels of professors (Sample A) are higher than those of scientific staff members (Figure 9). This difference between Sample A (n = 167, Ø = 3.802, SD = 1.228) and Sample B (n = 430, Ø = 4.295, SD = 1.046) is statistically significant when testing across all departments with a two-tailed t-test[6], $t(595) = -4.915$, $p = < .001$. It remains significant in an ANOVA with the same specifications, except for the addition of department membership as a second independent variable to control for the confounding influence of interdepartmental differences, $F(1, 579) = 23.901$, $p < .001$. Therefore it can be concluded that professors and scientific staff perceive the ETH Zürich air travel project differently.

Notably, the two department with the lowest average approval ratings among professors (Sample A) are also the two departments with the largest divergence between professors (Sample A) and scientific staff, with the scientific staff much more in favor of the project (Figure 7). This indicates that whatever factors caused these departments to score very low on project approval in the first survey are limited to professors. However, the observed difference between Samples A

[4] The question text differed very slightly between the two surveys. First survey (Sample A): “Do you approve of the ETH air travel project?” Second survey (Sample B): “Do you approve of the ETH Zurich air travel project?” It is unlikely that this created a difference between the surveys, as the project in question was clearly defined on the first page of the survey, as well as in the e-mail by which survey respondents were recruited. Also, the answer option “Can’t say” from the first survey was changed to “Don’t know” in the second survey, and the second survey, unlike the first, allowed participants to skip the question.

[5] The sample size was here considered sufficient to make the t-test robust to the skewed dependent variable. For the ANOVA, the case is less clear given the many groups created by the 16 departments; however, ANOVA has the ability to include department membership in its model. For that reason, the results of both tests are reported for joint interpretation.

[6] See above. Inclusion/exclusion criteria also as above.

and B across ETH Zurich is not merely attributable to these two departments, since it remains highly significant when these departments are excluded from the analysis, t(536) = -3.029, *p* = .003 (Sample A in this scenario: n = 139, Ø = 3.971, SD = 1.154; Sample B: n = 399, Ø = 4.293, SD = 1.052).

Visual inspection suggests that even within the scientific staff, different seniority levels may exhibit different degrees of support for the project, with approval generally decreasing further up the seniority ladder (Figure 9). However, even the sub-groups with the lowest mean approval ratings (senior scientists, Oberassistent*innen, and titular professors; combined n = 90, Ø = 4.189, SD = 1.198) show significantly higher approval than professors (Sample A) in a two-tailed t-test[7] across all departments, t(255) = -2.427, *p* = .016. Therefore, the observed difference between professors and scientific staff is not merely due to a difference between professors and postdocs/doctorate students. Regarding differences between other seniority levels within the scientific staff, there is no significant difference between postdocs/doctorate students (n = 329, Ø = 4.334, SD = 0.987) and Oberassistent*innen/senior scientists/titular professors (specifications as above), t(417) = 1.181, *p* = .238. Although information about the student sample is included in Figure 9 for reference, this is not further explored here due to likely sampling bias in this population (see section 4.3).

These findings shine a new light on the frequently argued necessity to protect the travel opportunities and thereby the career prospects of early career researchers and students, which has been a common topic in the debate surrounding the air travel project at ETH Zurich. It seems that the early career researchers are in fact more open to a reduction of professional air travel in academia than their seniors, and although professors may be motivated by a genuine desire to protect the interests of early career researchers, it may be useful to engage in dialogue with early career researchers about this issue and their stake in it. That said, some scientific staff members in the studied sample do specifically point out the necessity to attend to the special needs of early career researchers, and to make certain that early career researchers aren't disadvantaged relative to professors when it comes to travel.

[7] See above. Inclusion/exclusion criteria also as above.

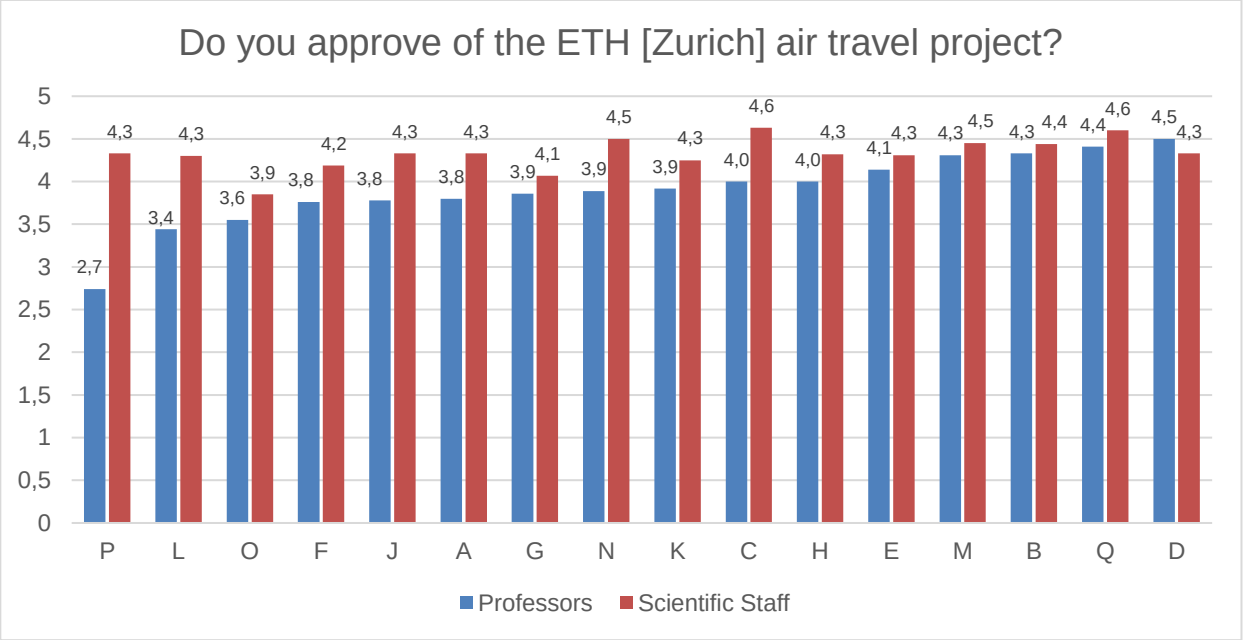

Figure 7. Average approval ratings among professors (Sample A, first survey, n = 163) and scientific staff (Sample B, second survey, n = 297) for each department. Note that the displayed values may be distorted for some departments with a small number of participants.

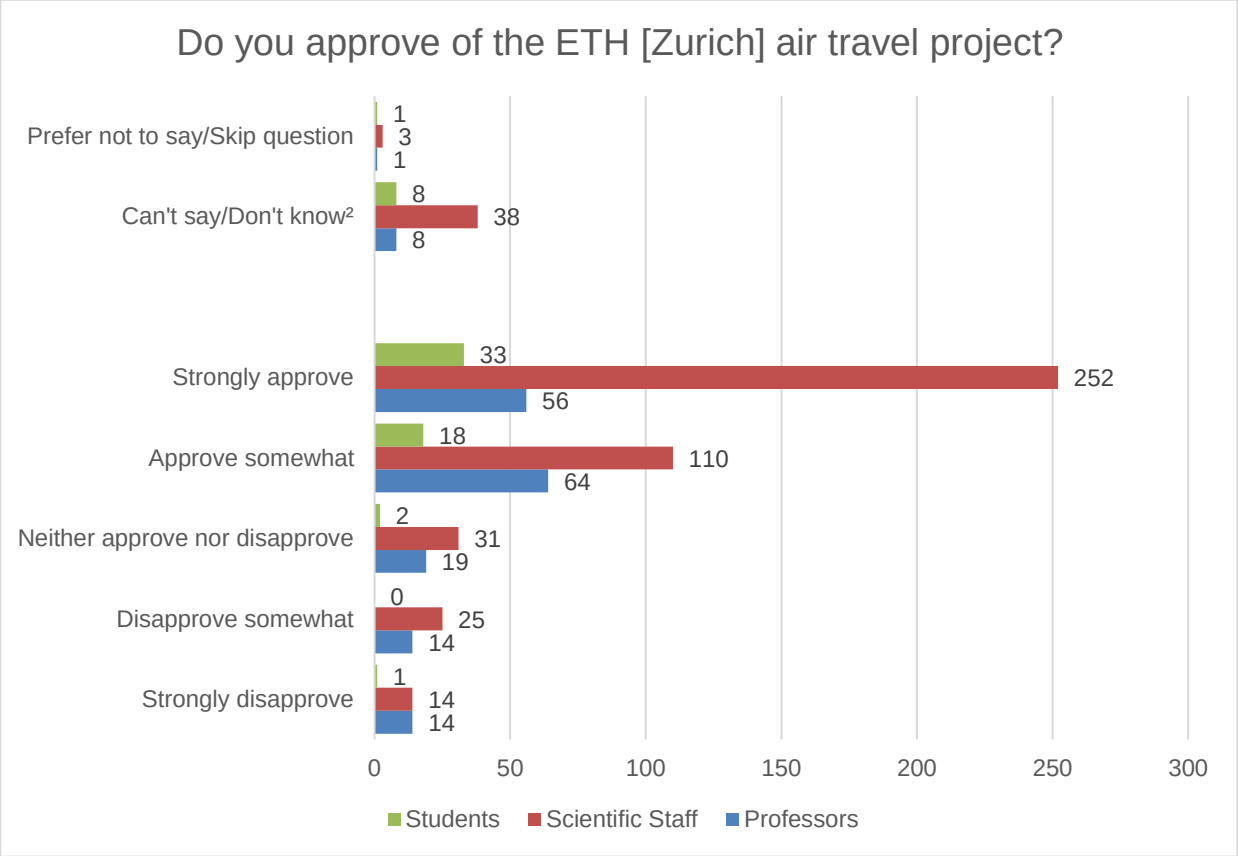

Figure 8. Project approval in Sample A (professors, first survey), Sample B (scientific staff, second survey), and Sample C (students, second survey). All participants from the respective samples are represented in this figure.

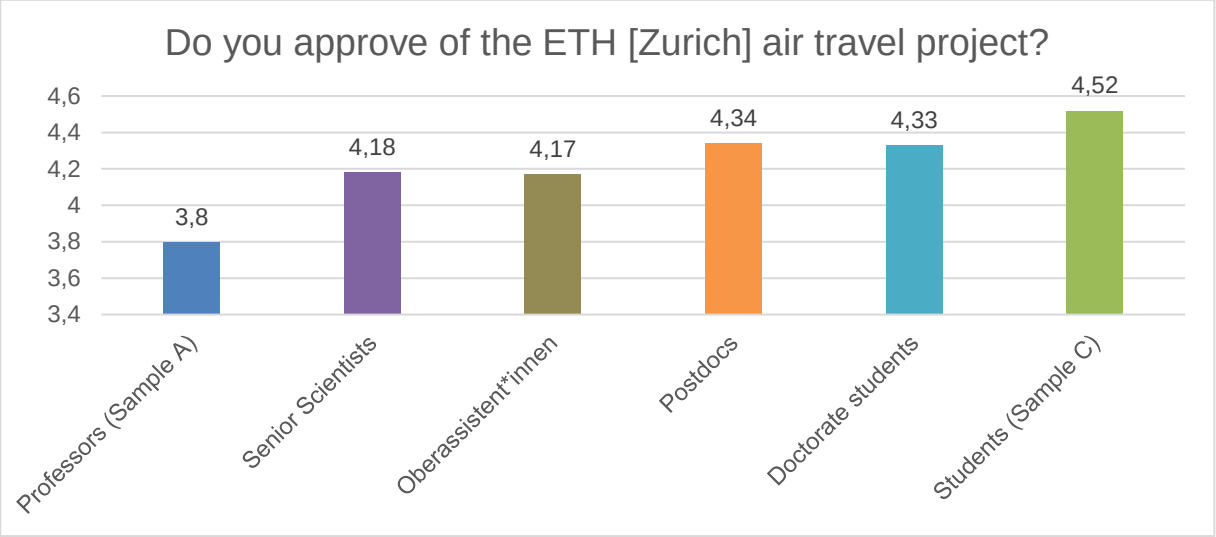

Figure 9. Average ratings for approval of the ETH Zurich air travel project by seniority, combining Samples A (n = 167), B, and C (n = 54). Sample B is further split into senior scientists and titular professors (n = 33), Oberassistent*innen (n = 59), postdocs (n = 86), and doctorate students (n = 247). Professors are drawn only from Sample A; the professors in Sample D show even lower average approval of only 3.32.

5.3.3. Summary

The ETH Zurich air travel project appears to have been received well within the institution, with some variation between the departments, and with scientific staff indicating greater project approval than professors.

While the professors in the first survey are well informed about the project, the senior scientists and titular professors in the second survey are less so, the lower-ranking scientific staff members even less, and few students know about the project at all. This pattern reflects a lack of debate surrounding the topic within some departments, and shows that reaching students and non-professorial scientific staff poses a challenge. Further emphasizing the role of these debates, word of mouth accounts for the second and third most common pathway in which people first learned about the air travel project, surpassed only by direct e-mails from ETH Zurich or one's own department.

5.4. Suggestions for the ETH Zurich air travel project

5.4.1. Reduction targets at the department level (Sample B)

In the second survey only, participants were asked which reduction target they would find appropriate for their own department to pursue by 2025. Figure 10 displays the distribution of the 335 valid responses in Sample B (scientific staff). One response, “500%”, was removed from the analysis. Responses indicating ‘a value larger than x’, were recoded as ‘x’. Responses indicating a range were recoded as the mean of the range. “o or even increase if necessary” was recoded as 0. Other answers, which were removed from the analysis, include “minimum”, “as much as necessary”, “as much as possible”, “eliminate air travel where other options are available”, and “I think there should be a target emission rate, rather than a percentage reduction”.

The median across all departments is 50%, a much more ambitious target than the overall 11% (or 22%, if the annual efficiency gains of the airlines are not counted towards the achieved reduction; this complexity was not reflected in the survey questions) defined by the departments in the ETH Zurich air travel project to date. While this data may be biased if a particular interest group was more likely to participate in the survey, this is still a large difference worth noting. Department means range from 35% to 59% (Figure 11); since the most ambitious department goal in the ETH Zurich air travel project is 20% reduction, this means that the average suggested reduction targets of Sample B consistently exceed actual targets in all departments. Suggested and actually declared targets are significantly and moderately correlated among the departments ($r = .560$, $p = .024$), but the small number of departments makes it impossible to determine whether this reflects a true association or is statistical artefact. A true association would indicate that although the reduction targets were largely decided by the professors of each department, they do to some degree reflect or influence the views of the scientific staff (albeit being less ambitious than the targets suggested by scientific staff members).

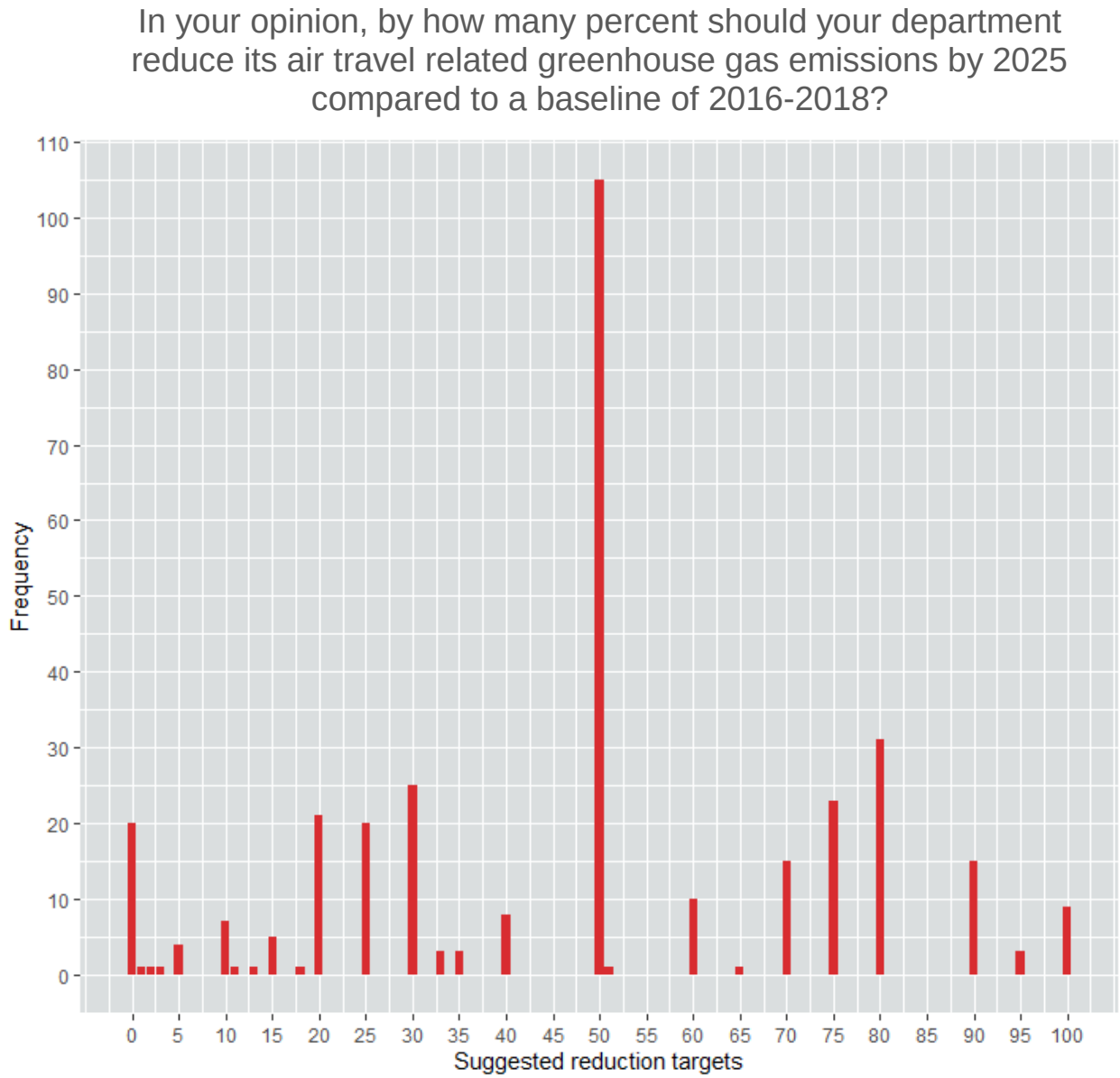

Figure 10. Distribution of suggested reduction targets in Sample B. n = 335.

In your opinion, by how many percent should your department reduce its air travel related greenhouse gas emissions by 2025 compared to a baseline of 2016-2017?

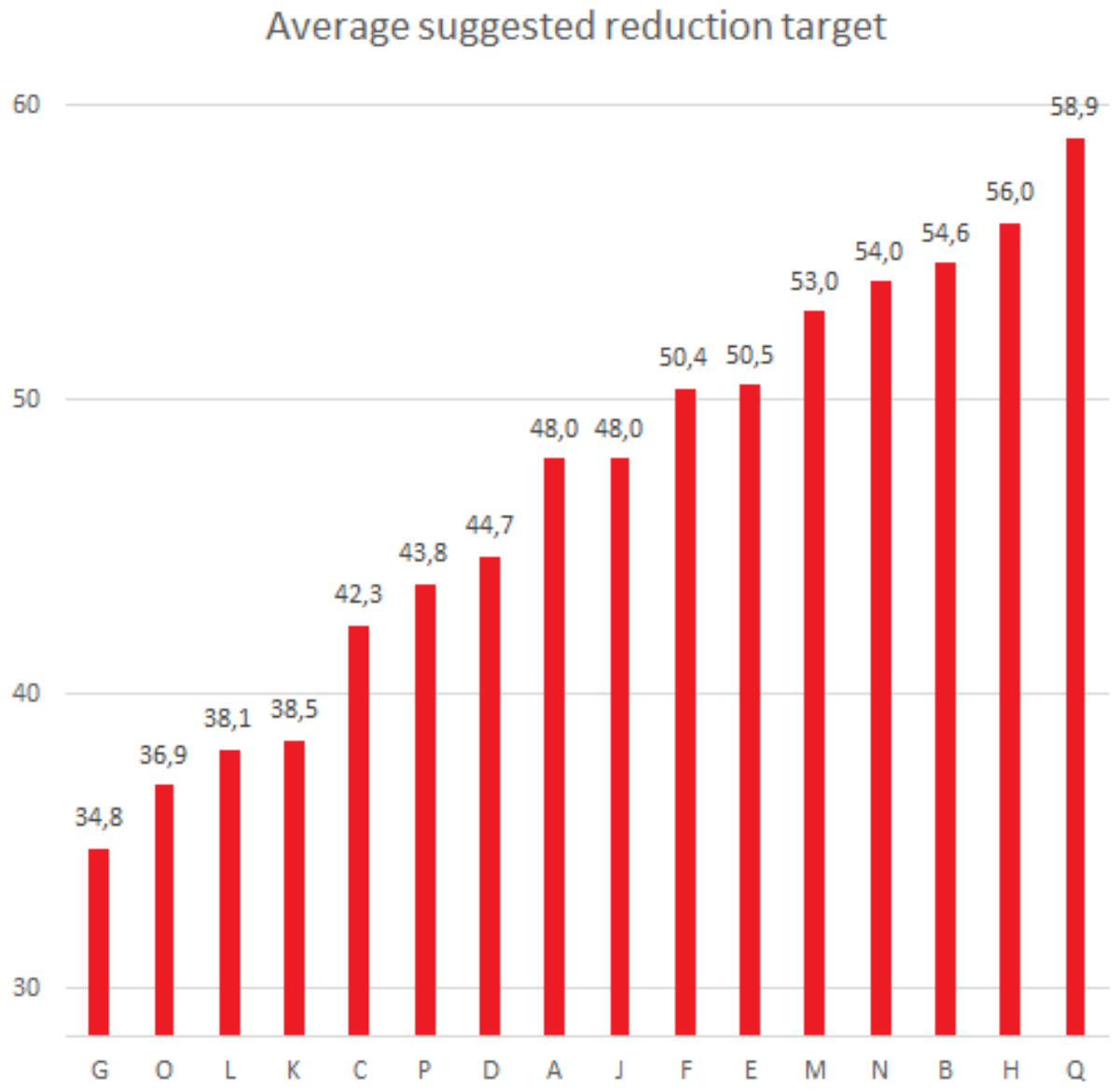

Figure 11. Average suggested reduction targets for each department (n = 231). Graph is cut off at 30 in order to make differences more easily discernible.

5.4.2. Policy endorsement at the department level (Sample B)

In the second survey, participants were asked whether they would support the implementation of any out of a selection of 20 policies to reduce air travel related emissions in their department. These policies were selected to represent a wide range of possible interventions with differing levels of stringency and controversy, as well as different mechanisms of change, and different areas of focus. Participants were asked to select any policies they would support in a multiple choice question. Due to this setup, it is not possible to differentiate whether a particular participant would not support a certain policy, or simply skipped the question; both cases are counted as no support in the following analyses.

Table 4 displays the percentage of participants per department who indicate support of each given policy. On one hand, the table clearly shows that some policies which are little approved across most departments nevertheless enjoy above-average support in individual departments, advising a closer look at each department's unique profile if the results from this report are to be used for future policy making. On the other hand, the endorsement pattern of each department correlates strongly with the overall pattern with a correlation coefficient of at least $r = .73$, meaning that there are large commonalities between the departments.

By far the most well-liked measure overall among the scientific staff is mandatory ground travel within Switzerland (84% support), followed by mandatory ground travel for trips shorter than a specific (though not specified in the question) duration (74%), and funding first class train travel for long train trips (62%).

The least liked policy is carbon budgets for flights per group per year based on previous years (23%); some open-ended answers suggest that this may in part be because, unlike per-person budgets/limits, per-group policies are seen as open to exploitation, where more senior members could "use up" the group allowance and none is left for more junior group members.

Other little-liked policies are recommended economy class seats (26%), carbon offsetting (27%), giving awards for emission reductions (27%), and a carbon fund (28%). The lack of support for carbon offsetting in particular is interesting given that the majority of departments did decide to offset their air travel related greenhouse gas emissions.

In the case of economy class travel, a main issue is clearly with the lack of stringency, for a much higher percentage of participants support mandatory economy class air travel (52%). Similarly, while a ban on air travel within a certain travel time is widely supported, the less stringent equivalent of only recommending ground travel for trips shorter than a specific duration is considerably less popular (44%). It thus seems that stringent measures are considered acceptable, and even preferable to laxer variants, when the behavior in question is considered unnecessary and alternatives are readily available. Several participants explicitly state as much, although the opposite opinion (that everything should be voluntary) is also voiced.

In the case of the policy "Changes in curriculum to reduce student flights (e.g. choosing less distant excursion destinations)" it seems relevant to consider the views of the student participants (Sample C, second survey). 44% of participants in this group support the policy, a relatively similar percentage as in Sample B. However, it should be noted once again that the

student sample was not systematically recruited, and is thus more likely to suffer from selection bias than the other samples.

5.4.3. Qualitative responses (All samples)

Numerous participants used the opportunity provided by the open-ended answers in both surveys to raise criticism of the ETH Zurich air travel project, as well as to offer suggestions for improving it. The qualitative responses, while not discussed in this report, were anonymized and in that form forwarded to the project lead in order to enable organizational learning.

5.4.4. Summary

The scientific staff suggest much more ambitious reduction targets to their own departments than the targets actually set out by those departments. Another interesting mismatch between the official policies and the views of Sample B is that the scientific staff count carbon offsetting among the least favored policies, along with recommending (rather than mandatory) economy class seats in case of air travel, and group-level carbon budgets based on emissions in previous years. In contrast, bans on short-haul air travel (especially domestic) emerge as the most favored policies, receiving above-average levels of support in every department.

	All	H	F	A	G	K	O	B	N	P	L	M	E	Q	J	C	D
Mandatory ground travel (e.g. train) within Switzerland except in justified cases	84	68	79	88	87	80	73	89	84	82	83	91	75	89	87	94	85
Mandatory ground travel (e.g. train) to destinations reachable within a certain travel time on the ground	74	68	71	81	87	80	59	67	74	64	75	87	63	85	73	71	75
Funding first class train travel for long train trips	62	45	65	50	67	73	45	56	42	68	58	74	69	63	67	82	65
Investment in infrastructure for virtual communication	57	45	65	75	40	47	32	44	42	73	33	78	50	76	67	71	55
Minimizing the number of in person job interviews with previous rounds conducted virtually	54	64	47	56	53	47	59	44	58	50	33	48	56	61	80	76	50
Mandatory economy class seats except in justified cases	52	41	47	56	40	60	45	33	63	41	50	65	56	57	67	41	60
Carbon tax (to be paid to the department by groups depending on the CO2 emitted by their air travel)	51	68	50	63	47	53	45	56	47	50	42	57	56	59	40	53	55
Investment in support for virtual communication	48	50	47	63	33	53	32	44	42	55	33	52	56	57	40	53	40
Recommended ground travel to destinations reachable within a certain travel time on the ground	44	45	35	25	73	33	59	56	42	45	50	48	44	39	67	53	25
Assistance in booking the most carbon efficient flight	40	32	38	63	47	20	41	44	37	36	25	48	44	41	60	41	40

Table 4. Percentage of participants per department who indicate that they would support each measure in their department (calculated as “tick” responses divided by total). Cells highlighted in blue contain low percentages, cells highlighted in red contain high percentages. Table continues on the next page.

	All	H	F	A	G	K	O	B	N	P	L	M	E	Q	J	C	D
Recommended ground travel to destinations reachable within a certain travel time on the ground	44	45	35	25	73	33	59	56	42	45	50	48	44	39	67	53	25
Changes in curriculum to reduce student flights (e.g. choosing less distant excursion destinations)	39	50	35	25	27	47	27	44	21	23	33	35	31	52	47	41	65
Recommended use of decision guidelines for which flights are necessary	35	18	21	19	33	33	23	44	53	41	33	57	50	30	27	65	35
Mandatory limit on flights per person per year except in justified cases	33	36	38	44	7	40	14	33	32	14	25	48	38	43	40	35	55
Organized reflection on hiring processes which privilege frequent flying academics	32	55	24	38	40	47	18	33	16	23	42	43	38	35	40	24	50
Recommended limit on flights per person per year	32	27	32	31	40	33	23	44	26	41	33	26	44	22	47	41	20
Carbon fund (each group pays the same amount of money into a pool each year; the money is redistributed to the groups based on their emission reductions that year)	28	27	21	19	40	33	18	33	16	9	50	22	44	28	33	35	35
Department internal award for largest emission reduction	27	9	29	38	40	27	18	56	26	9	17	39	38	24	20	41	20
Carbon offsetting (licenses purchased from an external company)	27	23	18	19	40	33	18	22	16	18	8	39	50	30	7	47	35
Recommended economy class seats	26	18	29	31	47	33	14	22	16	41	25	26	31	13	40	24	15
Carbon budget for flights per group per year based on previous years	23	18	29	38	27	27	18	11	5	18	33	22	31	20	33	29	30

5.5. Reported behavior and related constructs

5.5.1. Factual air travel behavior and related emissions

Great efforts have been undertaken over the last years within the context of the ETH Zurich air travel project in order to quantify the factual air travel of ETH members (professors, scientific staff, students, and administrative/technical staff), and the related greenhouse gas emissions. Those efforts are not the focus of this report, which instead covers self-reported behavior and similar subjective constructs. The interested reader is directed rather toward the project website (www.ethz.ch/airtravel), where relevant data will be published periodically.

5.5.2. Self-reported previous air travel (Sample B)

In the second survey, participants were asked if they flew for their work at ETH Zurich at all in 2018 or 2019. This time frame of reference was chosen in order to clearly exclude the influence of the COVID-19 pandemic. Participants could respond “yes”, “no”, “don’t know”, and “prefer not to say”. The question was intended not as an objective measure by which to extrapolate to air travel volume across ETH Zurich, but rather to describe the sample, to allow more detailed analysis and interpretation of subsequent questions about behavior change, and especially to ease participant resistance to the subsequent question “Are you personally willing to reduce your own professional air travel (compared to pre-COVID-19 levels) in order to reduce greenhouse gas emissions and/or in order to comply with the ETH Zurich air travel project?” In the first survey, many participants used open-ended answer fields to state that they found that question difficult to answer, or rather felt that the proposed response options didn’t do them justice, because they had in fact already reduced their air travel, or already flew very little. Therefore, in the second survey, they were given a dedicated space to describe their (lack of) previous air travel.

268 participants in Sample B report having flown for work in the reference period, 193 report not having done so, 2 say they don’t know, 1 prefer not to say, and 9 didn’t answer the question. This means that at least 41% of participants in Sample B did not fly for work in the two years before the pandemic (and at least 57% had). Because no data is currently available on the distribution of flights between members of ETH Zurich, no direct inference can be made about whether Sample B is representative of ETH Zurich on this variable. However, in the following I compare the data for each seniority level to distribution data from a study by Ciers et al. (2018)[8] at EPFL, the other federal university in Switzerland which is similar to ETH Zurich in many regards.

Among the doctorate students, 45% say they did not fly for work at ETH during the two-year reference period (“don’t know” or other missing responses included in the total). Ciers et al. (2018) report that the doctorate students in their study took roughly 0.5 annual air trips, which would mean roughly 1 annual air trip during a two-year period comparable to the reference period in this survey. This data would be reconcilable with the sample characteristics in this study, if the remaining 55% of doctorate students had taken on average about 1.8 air trips within the reference period. However, this comparison is complicated by the fact that many doctorate students would not have been employed at ETH Zurich yet during the reference period, and several par-

[8] Ciers, J., Mandic, A., Toth, L. D., & Op‘t Veld, G. (2018). Carbon footprint of academic air travel: A case study in Switzerland. *Sustainability,* 11(1).

ticipants explicitly state that this made the question difficult to answer for them. While it was expected that such participants would leave the question blank, this appears not to have happened since only 9 participants did so, which is much lower than the expected rate of first- or second-year doctorate students in the sample.

Among the postdocs, 39% say they did not fly for their work at ETH Zurich during the two-year reference period ("don't know" or other missing responses included in the total). Ciers et al. (2018) found that postdocs took approximately 0.9 annual flights on average, amounting to 1.8 average flights in a two-year period. In order to reconcile this with the characteristics of Sample B, the remaining 61% of the postdocs in Sample B would have to have flown on average 3 times during the reference period.

Among the Oberassistent*innen, a category that did not exist in Ciers et al.'s (2018) study, 39% say they did not fly for their work at ETH Zurich during the two-year reference period (no "don't know" or other missing responses in this subgroup).

Among the senior scientists and titular professors, 18% say they did not fly for their work at ETH Zurich during the two-year reference period (no "don't know" or other missing responses in this subgroup). Ciers et al. (2018) found that senior scientists took approximately 2 annual flights on average, amounting to 4 average flights in a two-year period. In order to reconcile this with the characteristics of Sample B, the remaining 82% of the senior scientists, titular professors, and Oberassistent*innen would have to have flown on average 4.9 times during the reference period.

Visual inspection suggests that whether one used to fly for work during the reference period may be related to the importance one assigns to the topic of academic air travel (Figure 12), as well as to one's approval of the ETH Zurich air travel project (Figure 13). However, both the sign and magnitude of this difference vary greatly between the departments. Statistical tests were conducted in order to assess these effects across ETH Zurich:

Regarding perceived issue importance, a two-tailed t-test[9] comparing participants who report having flown for work during the reference period ($n = 263$, $Ø = 3.848$, $SD = 1.201$) to those who report not having flown ($n = 187$, $Ø = 4.150$, $SD = 1.135$) across all departments detected a significant difference between both groups, $t(448) = -2.687$, $p = .007$. This analysis included participants who did not state their department membership, but not those who listed "other" as their department membership, and not those who gave responses other than "yes" or "no" when asked about their flights during reference period. An ANOVA with the same specifications and inclusion/exclusion criteria, but adding department membership as a second independent variable in order to control for the confounding influence of interdepartmental differences, confirms this, $F(1, 432) = 7.243$, $p = .007$. Thus it can be concluded that scientific staff members who report having flown for their work at ETH Zurich during the reference period assign smaller importance to the issue of greenhouse gas emissions caused by academic air travel than those who report not having flown.

[9] The sample size was here considered sufficient to make the t-test robust to the skewed dependent variable. For the ANOVA, the case is less clear given the many groups created by the 16 departments; however, ANOVA has the ability to include department membership in its model. For that reason, the results of both tests are reported for joint interpretation.

Regarding project approval, another two-tailed t-test[10] was conducted also comparing participants who report having flown for work during the reference period (n = 252, Ø = 4.210, SD = 1.086) to those who report not having flown (n = 169, Ø = 4.459, SD = 0.938) across all departments, once again including participants who did not state their department membership, but not those who listed “other” as their department membership, and excluding those who gave responses other than “yes” or “no” when asked about their flights during reference period. The test detected a significant difference between both groups, $t(393) = -2.408$, $p = .017$. An ANOVA with the same specifications and inclusion/exclusion criteria, but adding department membership as a second independent variable in order to control for the confounding influence of interdepartmental differences, confirmed this, $F(1, 403) = 5.306$, $p = .022$. Thus it can be concluded that scientific staff members who report having flown for their work at ETH Zurich during the reference period are less supportive of the ETH Zurich air travel project than those who report not having flown.

[10] See above.

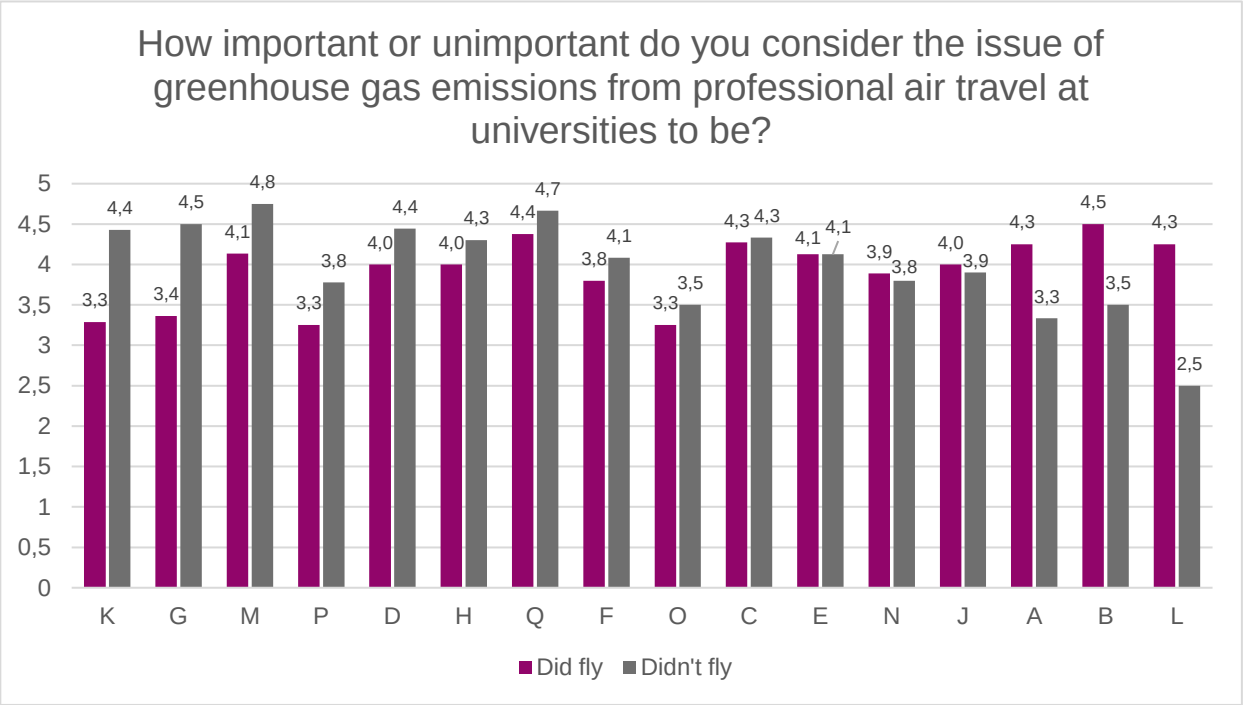

Figure 12. Average importance ratings per department for participants in Sample B (scientific staff, second survey) who report having flown for their work at ETH Zurich in the period 2018-2019 (n = 178) and for participants who report not having done so (n = 136). Departments are ordered from left to right by the magnitude and sign of the difference between the two groups. Note that the displayed values may be distorted for some departments with a small number of participants in at least one condition (in particular B, L, J, G).

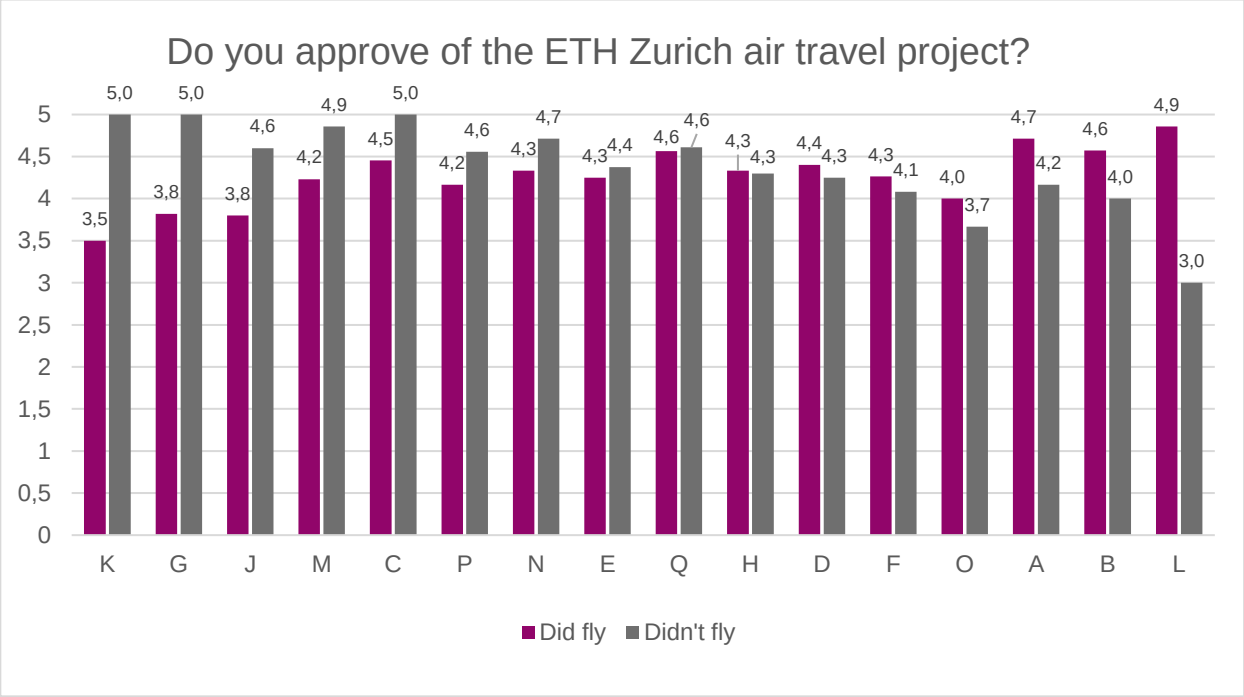

Figure 13. Average approval ratings per department for participants in Sample B (scientific staff, second survey) who report having flown for their work at ETH Zurich in the period 2018-2019 (n = 171) and for participants who report not having done so (n = 123). Departments are ordered from left to right by the magnitude of the difference between the two groups. Note that the displayed values may be distorted for some departments with a small number of participants in at least one condition (in particular G, C, J, B, L).

5.5.3. Perceived importance of air travel for one's own work (Sample B)

In the second survey only, participants were asked how important or unimportant they considered air travel to be for their work at ETH Zurich. They responded on a scale from 1 (very unimportant) to 5 (very important). Overall, the average rating is 3.11. Figure 14 displays the distribution of responses to this question in Sample B, split by whether participants indicated that they flew for their work at ETH Zurich in 2018-2019, or that they did not (see section 5.5.2). When taken together, the overall distribution of responses reveals a bimodal distribution. Unsurprisingly, a two-tailed t-test[11] comparing those participants who report having flown (n = 165, Ø = 3.445, SD = 1.215) to those who report not having flown (n = 180, Ø = 2.644, SD = 1.271) detected a significant difference between the groups, t(443) = 6.699, $p < .001$, so it can be concluded that those who report having flown during the reference period assign greater importance to their own flights than those who report not having flown.

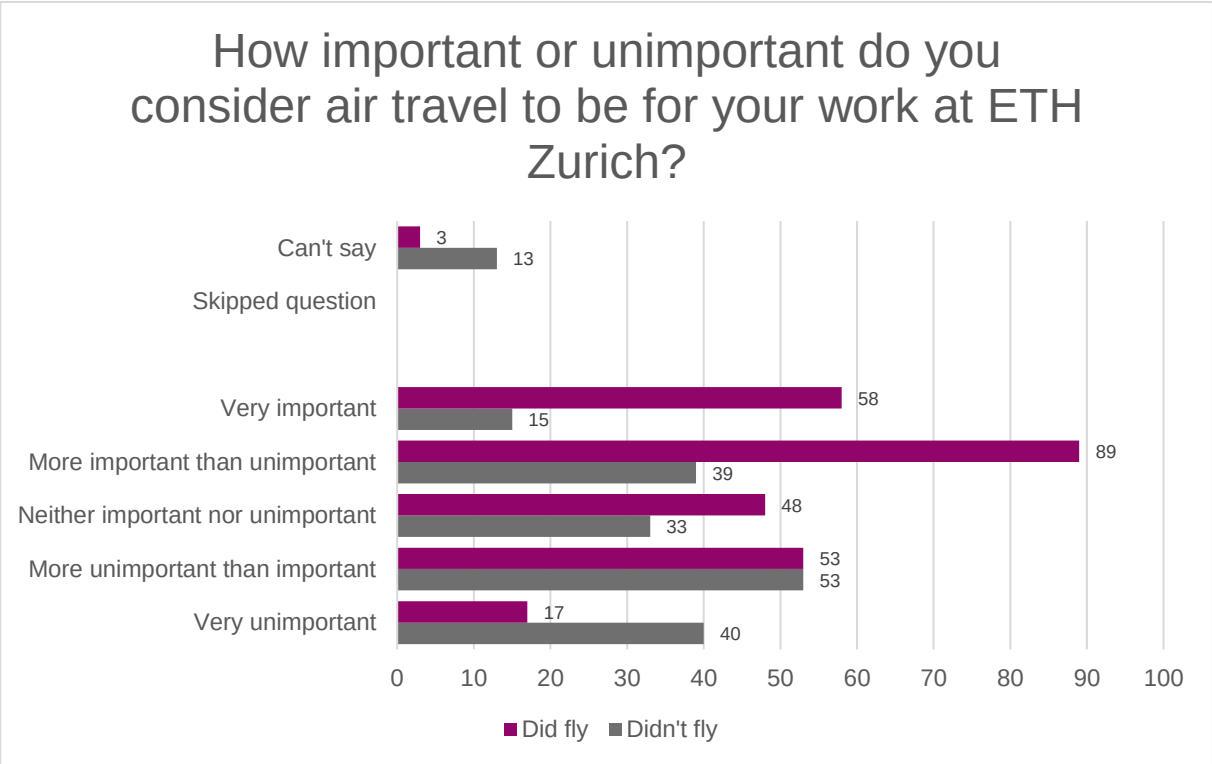

Figure 14. Distribution of responses in Sample B (scientific staff, second survey), split by whether participants report that they flew for their work at ETH Zurich in 2018-2019 (n = 268, Ø = 3.45) or that they did not (n = 193, Ø = 2.65).

[11] See above.

5.5.4. Self-reported past use of videoconferencing (Sample B)

In the second survey, participants were asked if they had attended a virtual conference/symposium/networking event related to their work at ETH Zurich in 2019 (before the COVID-19 pandemic). Participants could respond “yes” (124 responses), “no” (331 responses), and “don’t know” (10 responses). 8 participants didn’t answer at all. This means that overall, at least 26% participated in such a virtual event in 2019 (and at least 70% did not). The percentage of virtual event participation varies somewhat between the levels of seniority (doctorate students: 22%, postdocs: 33%, Oberassistent*innen: 29%, senior scientists & titular professors: 35%). Interpretation of these numbers should take into account that due to high turnover rates, higher proportion of doctorate students than participants at other levels of seniority may not have been employed at ETH Zurich in 2019 yet, which may bring down the overall percentage of videoconference participation in that group compared to the others.

Overall, there is no significant association between self reported past use of videoconferencing and self-reported past air travel, $X^2(2, N = 461) = .028$, $p = .952$.

While this question was included in the survey merely to describe the sample and to enable a clearer understanding of responses to other questions about behavior change, the responses may be helpful for upcoming investigations about the long-term impact of the COVID-19 pandemic on virtual conferencing habits of ETH Zurich members.

5.5.5. Behavior change before the ETH Zurich air travel project (Sample B)

In the second survey, participants were asked if they had already reduced their professional air travel for environmental reasons before they learned about the ETH Zurich air travel project. They could respond “yes” (222 responses), “no” (108 responses), “don’t know” (14 responses), or “question doesn’t apply” (128 responses), as well as skip the question (1 participant). This question was added because four participants in the first survey mentioned such efforts in open answer fields without being prompted, and it was suspected that unless people were given a specific place to report past behavior change that had taken place before the ETH Zurich air travel project, this might introduce noise to other questions about behavior change due to the project, and willingness for future behavior change.

Excluding those who say that this question does not apply to them – for example because they were not yet employed long enough in an academic profession before learning of the ETH Zurich air travel project - at least 64% of the participants in Sample B (scientific staff) already made efforts to reduce their professional air travel before learning of the ETH Zurich air travel project (and at least 31% did not). This is a surprisingly high number, even when considering possible self-selection bias or social desirability bias.

5.5.6. Willingness to change behavior in the future (Samples A and B)

Participants were asked whether they would be personally willing to reduce their own professional air travel in the future. The question text and response options differed somewhat for this question:

- In the first survey, the question text was “Are you personally willing to reduce your own professional air travel in order to reduce greenhouse gas emissions and/or in order to comply with the ETH Zurich air travel project?”, with response options “Yes”, “No”, “Yes, by the following amount (in percent, not binding):”, “Can’t say”, and “Prefer not to say”.
- In the second survey, it was adapted to “Are you personally willing to reduce your own professional air travel (compared to pre-COVID-19 levels) in order to reduce greenhouse gas emissions and/or in order to comply with the ETH Zurich air travel project?”. Response options were “No”, “Yes”, “Yes, by the following amount (in percent, not binding):”, “Don’t know”, and “Prefer not to say”, and participants could skip the question.

Also, participants in the second survey, unlike those in the first survey, were asked this question following other questions about their past air travel during 2018-2019, the importance they assigned to air travel for their job at ETH Zurich, and any past air travel reductions they may have made before learning about the ETH Zurich air travel project. The questions, although similar, thus occurred in a rather different context, and therefore I warn against direct comparison.

Out of the 176 participants in Sample A (professors, first survey), 138 (78%) indicate that they are willing to reduce their own air travel. 26 (15%) say that they are unwilling. 11 (6%) say that they can’t say, and one participant preferred not to answer the question. Notably, of those who do not say that they are willing to reduce (including those who did not respond, who say that they can’t say, and who say that they are unwilling to reduce), 4 participants note unprompted

elsewhere in the survey (see section 4.6) that they already reduced their air travel in the past. Therefore only 19% of all participants do not indicate either past or intended future reduction efforts.

Of those participants in Sample A who do say that they are willing to reduce, 50% (n = 69) note unprompted elsewhere in the survey (see section 4.6) that they already reduced their air travel in the past. This finding shows that past reductions do not preclude future reductions – a large group of participants are planning to reduce their air travel further despite having already reduced. In fact, those who already reduced in the past are more likely than others to be willing to reduce further: 95% of this group say that they are willing to reduce their air travel, compared to only 67% among those who do not say that they had already reduced in the past. 28 of those who say they are willing to reduce also indicate by which percentage they would be willing to reduce, with values ranging from 10% to 80% (Ø = 34%).

There is some variation regarding willingness to reduce one's business air travel between the departments (Figure 15). One department, which already stood out with a particularly low average approval of the ETH air travel project, again stands out with singularly low willingness to change among professors.

Out of the 473 participants in Sample B (scientific staff, second survey), 368 (78%) indicate that they are willing to reduce their air travel in the future. 30 of these give a percentage by which they would be willing to reduce, with values ranging from 10% to 100% (Ø = 61%). 67 participants (14%) say they are unwilling to reduce, 31 (7%) say they do not know, 4 (< 1%) prefer not to say, and 3 (< 1%) skipped the question or were recoded as missing values due to inconsistent responses.[12]

Participants in Sample B were also asked whether they had flown for their work at ETH Zurich in 2018-2019 (see section 5.5.2), making it possible to test for an association between business air travel habits and willingness to reduce one's professional air travel. Participants who did not respond either "yes" or "no" to the question about past air travel were excluded from this analysis. Unsurprisingly, past business air travel and willingness to fly less are significantly associated ($X^2(1, n=425) = 9.642$, $p = .001$), with a higher percentage of those who travelled in the past being unwilling to reduce in the future.

Willingness to reduce one's professional air travel is also associated with having already reduced before hearing about the ETH air travel project ($X^2(1, n = 311) = 40.929$, $p < .001$) in Sample B, with a higher percentage of those who had already reduced in the past also being willing to do so in the future. This question was not asked in the first survey.

Willingness to reduce also differs significantly ($X^2(2, n = 357) = 14.194$, $p = .001$) between people who respond in different ways to the question whether the ETH air travel project has impacted them personally (see section 5.5.7), with the highest percentage of reported willingness to reduce one's behavior among those who report that they are already flying less because of the project (Figure 16). All of these results confirm the observation above, regarding Sample A,

[12] Two participants selected "Yes, by the following amount", only to state that they do not fly at all. Therefore they can't reduce further, and were not subsumed under "yes" responses in this section.

that reported past behavior change does not preclude reported willingness to change one's behavior in the future, but rather seems to predict it.

Finally, according to a Mann-Whitney-U test (U = 6572, z = -5.639, $p < .001$), participants in Sample B who report being willing to reduce their professional air travel (n = 354, Ø = 2.927, SD = 1.230) are more likely than 50% to assign lower importance to air travel for their own work than those who report being unwilling to do so (n = 65, Ø = 3.892, SD = 1.336).

Belonging to any particular level of seniority within the scientific staff (Sample B) is not significantly associated willingness to reduce one's professional air travel.

The size of Sample B did not permit comparing the relevance of these different predictors by applying a binary logistical regression. However, since many of these variables share some variance, it must be assumed that some of them owe the statistical association with willingness to change one's behavior not to a causal relationship, but rather to the mediating effect of one or more of the other variables, or perhaps of other variables which were not measured in this study.

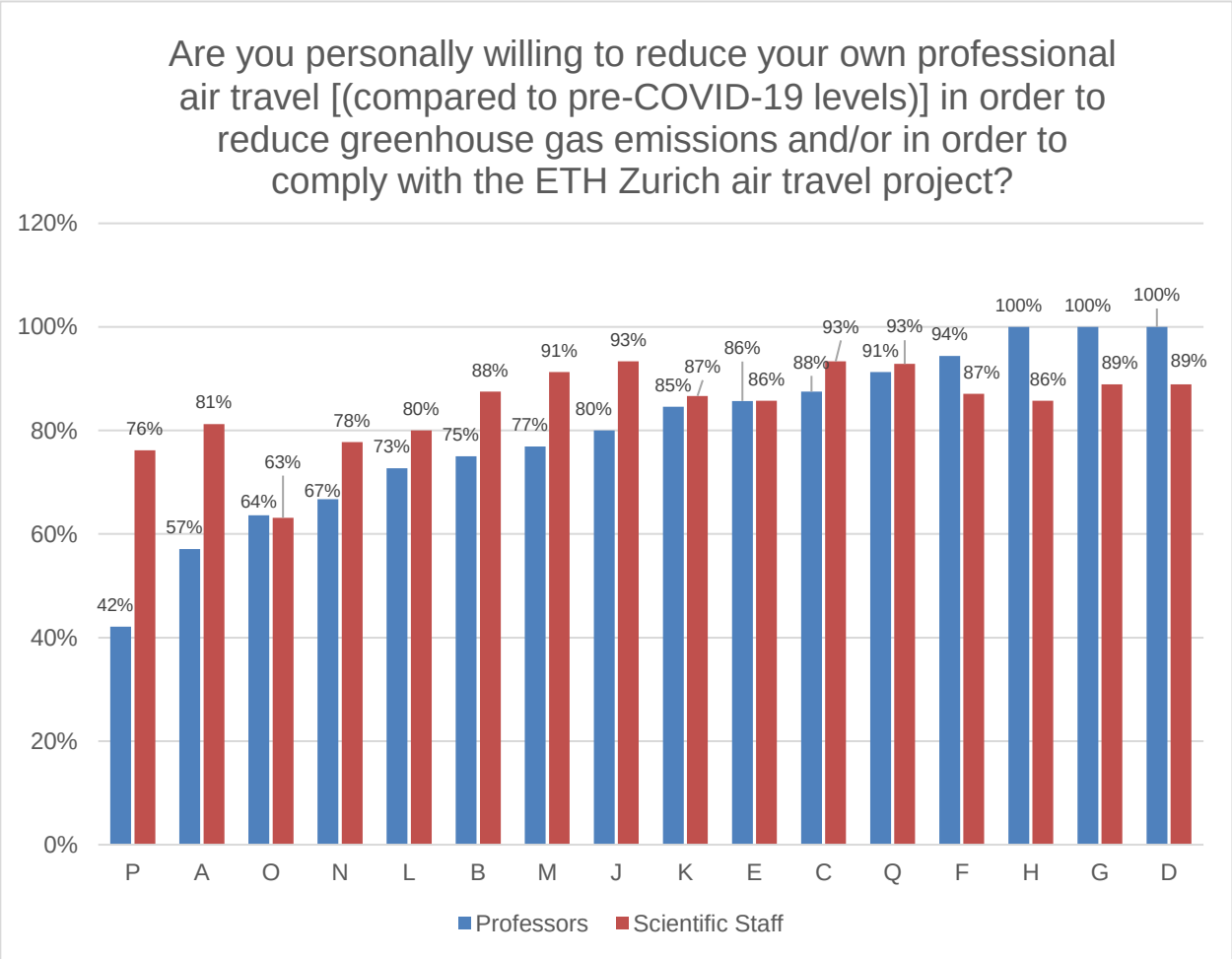

Figure 15. Percentage of participants from each department who say that they are willing to reduce their own air travel (calculated as “yes” and “yes, by the following amount:” responses divided by sample total, which includes “don’t know”, “can’t say”, “prefer not to say” and missing responses). Results are presented separately for professors (Sample A, first survey, n = 160) and scientific staff (Sample B, second survey, n = 295). However, caution must be applied when comparing the samples to each other, because the question and response options were phrased differently in the two surveys, and occurred in a different context due to different preceding questions.

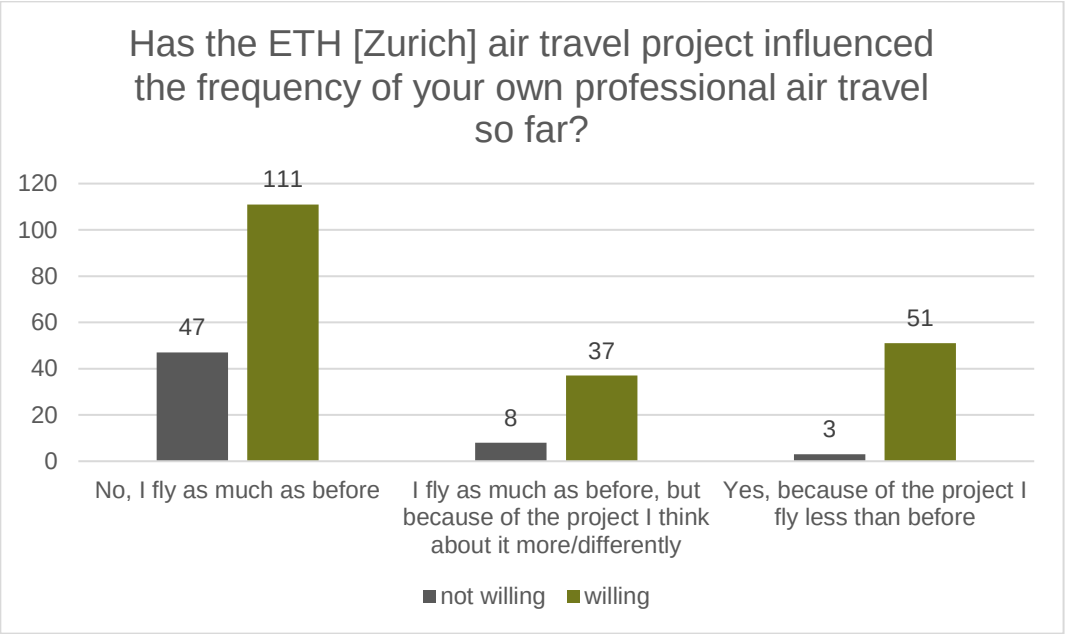

Figure 16. Number of participants in Sample B (n = 257) who are willing to reduce their own professional air travel, compared to those who are unwilling to do so. The results are displayed separately for participants who say that the ETH Zurich air travel project has caused them to fly less than before, those who say that the project has caused them to think about air travel more or differently than before but not to fly less, and those who say that the project has not impacted them (see section 5.5.7). The small number of participants who say that the project has caused them to fly more are not included here.

5.5.7. Project impact (Samples A and B)

Participants were asked how they (and, in the first survey, their group members) were affected by the ETH Zurich air travel project.[13] It must be noted that participants in the second survey, unlike those in the first survey, were asked this question following other questions about their past air travel during 2018-2019, the importance they assigned to air travel for their job at ETH Zurich, and any past air travel reductions they may have made before learning about the ETH Zurich air travel project. The questions thus occurred in a rather different context, and therefore I warn against direct comparison. In particular, the response options “No, I fly as much as before” and “I fly as much as before, but because of the project I think about it more/differently” may have caused less resistance in the second survey because participants who perceive their air travel as infrequent were able to state so in earlier questions, and may thus have found it easier to select these options without feeling that their efforts to reduce air travel were being overlooked.

Participants in Sample A (professors, first survey) were asked not only about the project’s impact on their own professional air travel, but were also presented an almost identical question inquiring about the effects on the members of their groups. In both cases, about a third of those who gave valid responses to the question (or 25% of Sample A in total) indicate no change, another third report a change in thinking but no behavior change, and the last third report a behavior change toward less flying. One person says that they fly more because of the project (Figure 17). “Invalid responses” here include those who say they prefer not to answer (1 participant when asked about impact on themselves, 1 participant when asked about one’s own group), and those who can’t say (18 when asked about themselves, 43 when asked about their group).

Figure 18 displays the distribution of responses in Sample B. Almost two thirds out of those who gave valid responses to the question (35.9% of the whole sample) report no impact of the project. A fifth of those who gave valid responses (10.8% of Sample B in total) report a change in thinking but no behavior change, another fifth (11.4% of Sample B) report a reduction in air travel, and two participants say that they fly more now because of the project. “Invalid responses” here include the 7 participants who skipped the questions, 168 who say they don’t know, and 21 who say they prefer not to answer. Compared to Sample A, the participants in Sample B report a much smaller overall impact of the project on themselves, and are much more likely to say that they do not know if the project affected them. Even when looking only at those who had already heard of the project before the survey, 48.6%[14] of those who gave valid responses to the question indicate no impact on themselves, as do 57.1%[15] among those who gave valid responses to the question and who report having flown during the reference period

[13] The question text and response options differed very slightly for this question. In the first survey, the question text was “Has the ETH air travel project influenced the frequency of your own professional air travel so far?”; in the second survey, this was specified as “… the ETH Zurich air travel project”. Also, the response option “Can’t say” from the first survey was rephrased as “Don’t know” in the second survey.

[14] Note that this percentage refers only to those participants who gave a valid response to this question, not to the total sample, unlike other percentages in this paragraph.

[15] Note that this percentage refers only to those participants who gave a valid response to this question, not to the total sample, unlike other percentages in this paragraph.

2018-2019. Therefore it does not appear that the smaller impact of the ETH Zurich air travel project on the scientific staff compared to professors is only due to lower project awareness or lower frequency of professional air travel in that group. A possible explanation could be that the scientific staff were already more sensitized to the topic of greenhouse gas emissions caused by academic air travel before the project, and therefore perceive a smaller impact of the project on themselves. This is, however, speculative.

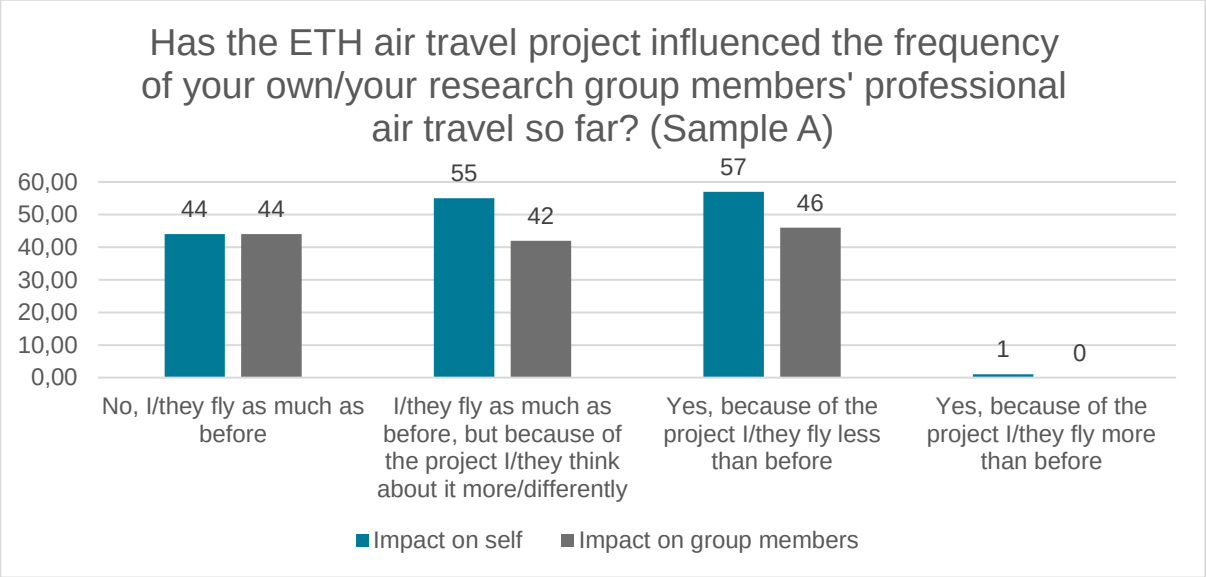

Figure 17. Self-reported impact of the ETH air travel project on one's own travel behavior (n = 157) as well as that of one's research group (n = 132) in Sample A (professors, first survey).

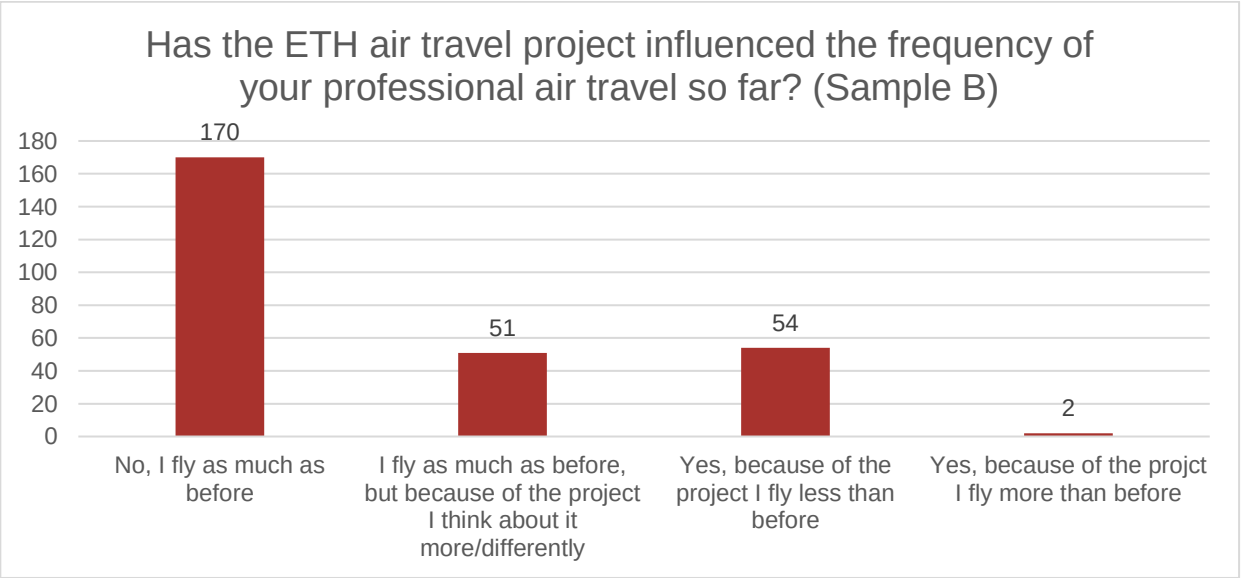

Figure 18. Self-reported impact of the ETH air travel project on one's own travel behavior in Sample B (scientific staff, second survey, n = 277).

5.5.8. Worries about potential consequences of flying less (Sample B)

In the second survey only, participants were asked whether they worried about any out of a selection of 8 potential consequences of reducing their own professional air travel. These consequences were selected based on the author's experience with the air travel discourse at ETH Zurich, with the aim to represent a wide range of worries while including expected chief concerns. Participants were asked to select any consequences they worried about in a multiple choice question. Due to this setup, it is not possible to differentiate whether a particular participant does not worry about a certain potential consequence, or simply skipped it; both cases are counted as an absence of worry in this section.

Figure 19 displays the percentage of participants per department who indicate that they worry about each potential consequence. With the exception of senior scientists and titular professors, the hierarchy of concerns is mostly the same for all seniorities, and absolute percentages do not differ drastically either. Senior scientists and titular professors, who have already built a reputation and a career for themselves, are not as worried about reducing their chances to have a successful future career, and more worried about not being perceived as an expert in their field.

Missing opportunities to build personal relationships with people working elsewhere is, predictably, the chief concern among all seniority groups. Other concerns which were brought up by participants (max. 3), excluding some which are mostly synonymous with those listed in the survey, include missing out on fieldwork, missing out on intercultural learning (both in terms of national culture and lab/work culture), and not being able to publish without attending conferences in certain disciplines.

Only a small number of people (8.5%) are not worried about any of the listed potential consequences, and also do not report any other concerns[16]. This number is much smaller than the number of those who support the ETH Zurich air travel project, consider the topic of greenhouse gas emissions from professional air travel in academia important, are willing to change their behavior in the future, or report already having changed their behavior in the past. It is therefore clear that those who support action on academic air travel or become active themselves do not act out of a lack of concern, but in fact share the concerns of those who disapprove of the same changes and appear to weigh these concerns against graver ones, most likely regarding climate change.

The percentage of people who are not worried about any of the listed potential consequences, and do not report any other concerns, is also much smaller than the percentage of people who report not having flown for their work at ETH Zurich during the reference period 2018-2019, at every level of seniority. In fact, even out of those who report not having flown during the reference period, only 10.9% say that they are not worried about any of the listed potential consequences. This shows that even those who fly very rarely for professional academic purposes are still concerned about potential negative consequences for themselves should they fly even less.

[16] There are 7 further participants who did not select any response options, including „none of the above". These were not added to the number of people who selected "none of the above". They were, however, included in the total used to calculate all percentages in this section.

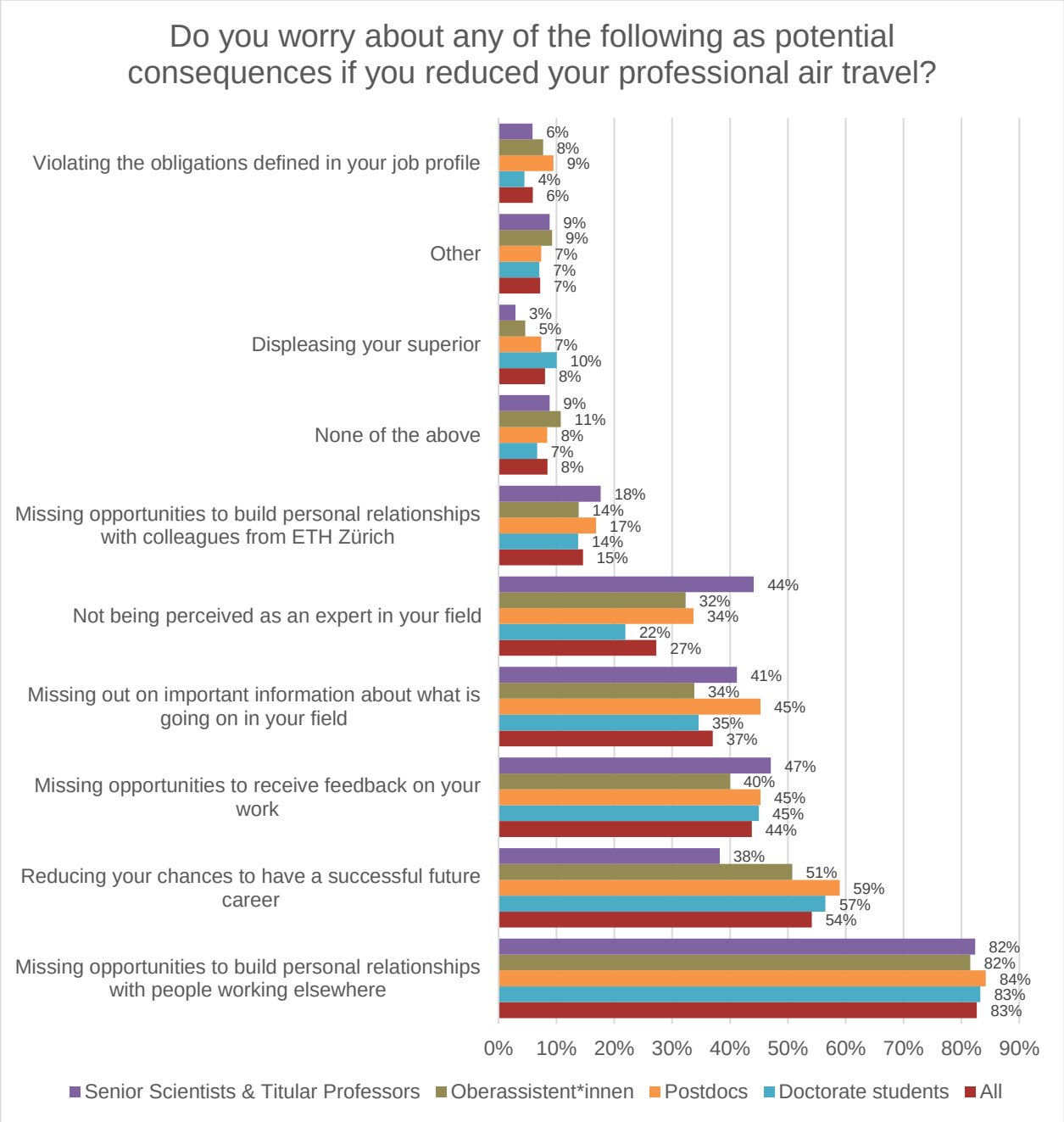

Figure 19. Percentage of participants who selected each potential consequence of flying less, split by level of seniority. Because this was an obligatory question, all (sub)sample sizes are equal to those reported in section 4.2 where the composition of Sample B is described.

5.5.9. Summary

Among professors as well as scientific staff, a rather high percentage of participants indicate that theyaere willing to reduce their own professional air travel in the future. These are often individuals who also say that they already reduced their air travel in the past (either due to the ETH Zurich air travel project or other reasons), or – in the case of the scientific staff – that they did not fly at all for their work during 2018-2019. This indicates that the members of ETH Zurich are involved in an ongoing process of behavior change, rather than one that is entirely in the past or entirely anticipated. Some of this change is attributed by the participants to the ETH Zurich air travel project, although the scientific staff consider themselves less affected by the project than the professors. Moreover, a substantial percentage of participants, especially professors, report that while their behavior has not been affected by the project, they have been encouraged to think differently about this behavior.

The importance assigned to air travel for the participants' own jobs (among the scientific staff) shows a slightly bimodal distribution, with one group who considers travel rather important and another one of the opposite opinion. Those who assign greater importance to travel for their work are more likely to have flown for work during the reference period, and are less likely willing to reduce their professional air travel in the future.

Among the scientific staff, missing opportunities to build personal relationships with people working elsewhere is the chief concern associated with reduced professional air travel. This finding echoes the common perception that in-person meetings are required for networking purposes especially (see section 5.1.2).

Use of videoconferencing is relatively low among the scientific staff, a result which will be interesting to revisit in the period following the COVID-19 pandemic.

6. Conclusions

Overall, the results of both surveys show that the majority of the members of ETH Zurich consider the topic of greenhouse gases associated with academic air travel important, approve of the ETH air travel project, and are willing to reduce their own professional air travel in order to reduce greenhouse gases.

If the self-report of ETH members is to be believed, the ETH Zurich air travel project has already had a measurable impact on the choices as well as the views of ETH's scientific staff and professors. These are positive results for the project, and encouraging to other institutions who may wish to implement similar air travel policies.

An especially useful contribution to such efforts, as well as to future development at ETH Zurich, might be found in the overview of the popularity of different policies provided here, in which the different departments of ETH Zurich may to some degree reflect the specific cultures and needs of different disciplines. It is interesting to note as well that the scientific staff suggest considerably more ambitious reduction targets to their departments than those departments have proclaimed.

The varying levels of knowledge about the project between departments, as well as the increasing lack of project awareness further down the seniority ladder, suggests that increased communication efforts about the project, especially targeting early career researchers, may be useful to ensure that all of ETH Zurich is involved in this long-term change process.

Unsurprisingly, this report once again emphasizes that fears around not being able to build strong connections with colleagues and other key partners internationally are central to discussions about reducing air travel in academia for ecological reasons. Such fears are not the domain of those who resist change, but are shared by the vast majority of participants in this survey. The significance of this, for academics, existential concern calls for a serious engagement with the ways in which communication and cooperation really occur between people, and especially within scientific communities, and an honest and creative re-examination of possible new approaches to networking in academia.

Another point worth emphasizing in this report is the position of doctorate students and postdocs in this debate. It is frequently argued that early career scientists in particular need professional air travel, and must be protected from pressure to reduce it, and indeed doctorate students and postdocs in this study voice some concerns about the potential of some policies to harm their career progression. However, it should also be noted that the doctorate students and postdocs in this study show especially strong support for the ETH Zurich air travel project, indicating that as long as reductions are distributed fairly across the seniorities, early career scientists are not limited to a role of special vulnerability to air travel reduction, but may instead be important agents of change.

Appendix A: Statistical analyses related to COVID-19

This appendix describes in detail the statistical tests comparing Sample A (professors, first survey) to Sample D (professors, second survey) in order to detect any time-bound differences, such as may have been created by the unfolding of the COVID-19 pandemic in between the two surveys.

The statistical significance tests reported in this section are exceptional within this report in that they test clear null hypotheses (that Samples A and D do not differ in regard to project approval and perceived issue importance). However, it must be noted that this hypothesis is here investigated not in its own right, but only to inform interpretation of the subsequent results presented in the report. The surveys were not designed to investigate the impact of the pandemic, and the small size of sample D means that small difference between the two time periods due to the pandemic couldn't be detected with a reasonable power using this data. Still, comparing Samples A and D improves understanding of the data on which this report is based, and to what degree the pandemic may affect findings.

Regarding project approval, both samples received almost exactly the same question text and answer options.[17] Participants who said they can't or prefer not to answer were excluded from this analysis, leaving 167 cases in Sample A (Ø = 3.802, SD = 1.228) and 22 cases in Sample D (Ø = 3.318, SD = 1.615). The descriptive difference in means is 0.484, half a scale point on the five-point answer scale used for this question. The median in both samples is 4. As project approval is heavily skewed (see section 5.2.3), and the small size of sample D was thought to compromise the robustness of a t-test to this skewedness, a two-tailed Mann-Whitney-U test was employed, which did not detect a significant difference between Samples A and D at a confidence level of 0.95 (U = 1582, z = -1.107, approximate p = .268). Because the shapes of the distributions of project approval within each sample are dissimilar, this result must be interpreted such that values from neither sample have a probability greater than 50% to be larger than values from the other. This test, however, is estimated to have low post hoc power of around 30%.

In order to ensure that a possible difference between the samples was not being masked by differences between the 16 departments of ETH Zurich, the empirical data from Sample D were tested against hypothetical data (D*) which could have been expected given that there was no difference between the samples. In this hypothetical dataset, the empirical value for each individual from Sample D was replaced with the average value for that individual's department from the first survey (Sample A), rounded to the nearest scale point. The values of the 7 individuals in Sample D who do not provide a department affiliation were replaced with the total sample average from the first survey (Sample A), rounded to the nearest scale point. The mean of this estimated dataset D* was 3.591; the mean of the empirical data therefore differs from that of the estimated data by 0.273, approximately one third of a scale point on the five-point response scale

[1] The question text differed very slightly between the two surveys. First survey (Sample A): "Do you approve of the ETH air travel project?" Second survey (Sample B): "Do you approve of the ETH Zurich air travel project?" It is unlikely that this created a difference between the surveys, as the project in question was clearly defined on the first page of the survey, as well as in the e-mail by which survey respondents were recruited. Also, the answer option "Can't say" from the first survey was changed to "Don't know" in the second survey, and the second survey, unlike the first, allowed participants to skip the question.

used for this question. The median in both samples was 4. Again, because the dependent variable was very skewed and the small sample size compromised the robustness of a t-test to this skewedness, a two-tailed Mann-Whitney-U test was employed to compare samples D and D*, which did not detect a significant difference at a confidence level of .95 (U = 235.5, z = -.162, approximate p = .871). Because the shapes of the distributions of project approval within each sample were dissimilar, this result must be interpreted such that values from neither sample have a probability greater than 50% to be larger than values from the other. The non-significant result in the original Mann-Whitney-U test reported in the paragraph above is therefore not attributable to a confounding influence of department membership.

Regarding perceived importance of the issue, both samples received slightly differing question text.[18] Participants who say they can't or prefer not to answer were again excluded from this analysis, leaving 172 cases in Sample A (Ø = 3.808, SD = 1.201) and 22 cases in Sample D (Ø = 3.455, SD = 1.262). The descriptive difference in means is 0.353, about one third of a scale point on this five-point scale. The median in both samples is 4. Again, as perceived importance is heavily skewed (see section 5.2.1) the small size of sample D was thought to compromise the robustness of a t-test to this skewedness, a two-tailed Mann-Whitney-U test was employed, which did not detect a significant difference between Samples A and D at a confidence level of 0.95 (U = 1561, z = -1.409, approximate p = 159). Because the distributions of perceived importance within the samples are similar, this result can be interpreted such that the median score for perceived importance did not differ between the samples. However, this test is estimated to have low post hoc power of around 23%.

In order to ensure that a possible difference between the samples was not being masked by differences between the 16 departments of ETH Zurich, the empirical data from Sample D were tested against hypothetical data (D*) which could have been expected given that there was no difference between the samples. In this hypothetical dataset, the empirical value for each individual from Sample D was replaced with the average value for that individual's department from the first survey (Sample A), rounded to the nearest scale point. The values of the 7 individuals in Sample D who do not provide a department affiliation were replaced with the total sample average from the first survey (Sample A), rounded to the nearest scale point. The mean of this estimated dataset D* was 3.773; the mean of the empirical data therefore differs from the estimated data by 0.318, approximately one third of a scale point on the five-point response scale used for this question. The median in both samples was 4. Again, because the dependent variable was skewed and the small sample size was thought to compromise the robustness of a t-test against this skewedness, a two-tailed Mann-Whitney-U test was employed comparing the empirical sample D against the estimated sample D*. The test was not significant (U = 256, z = .376, approximate p = .707). Because the distributions of perceived importance within the samples were dissimilar, this result must be interpreted such that values from neither sample have a probability greater than 50% to be larger than values from the other. The non-significant result in the original Mann-Whitney-U test reported in the paragraph above is therefore not attributable to a confounding influence of department membership.

[18] The first survey asked "How important do you consider the issue of greenhouse gas emissions from professional air travel at universities?", the second asked "How important or unimportant do you consider the issue of greenhouse gas emissions from professional air travel at universities to be?" Answer option "Can't say" from the first survey was again rephrased as "Don't know" in the second survey, and again, the second survey, unlike the first, allowed participants to skip the question.

In short, no significant difference was found between Sample A and Sample D on either project approval or perceived importance of the issue. However, because the statistical power achieved is low, it is not possible based on this data to conclude that no time-bound differences exist between the two surveys.

Appendix B: First survey

Page 1

Which department do you work at?

If several apply, please choose your primary affiliation.

[Please choose]

Which position(s) do you hold?

Please select any that apply.

- Full/associate/assistant professor
- Titular professor
- Administrative position
- Other (specification optional):

- Prefer not to say

Before this survey, have you heard of the ETH air travel project which aims to reduce ETH greenhouse gas emissions?

- No
- Yes

Page 2

Optional background information on the Air Travel Project

In early 2017, ETH Zurich launched a project aiming to reduce greenhouse gas emissions from professional air travel by ETH members. The departments, Executive Board, and administrative units at ETH Zurich each defined for themselves a per capita reduction target and decided on measures for reaching it. Targets as well as measures vary between units. At the school level, the targets amount to a reduction of approximately 11% by 2025 compared to the average of 2016-2018. This includes flights taken by staff as well as flights taken by students as part of their curriculum.

In addition, the majority of the departments offset air travel emissions, with ETH Zurich joining the Federal Office for the Environment (FOEN) together with many other federal agencies. This compensation is not counted towards the reduction targets, but is an additional measure.

For more information, visit the project's website, on which this excerpt is based. **Open this link in a separate tab or your survey progress will be lost.**

Page 3

Within the past two months, how often have you spoken with other people at ETH (colleagues, students, ...) about the ETH air travel project and/or about the issue of greenhouse gas emissions from professional air travel at universities?

Please choose the answer that fits best.

Never	1 – 2 times	3 – 5 times	6 – 10 times	More than 10 times	Can't say	Prefer not to say

Do you approve of the ETH air travel project?

Strongly disapprove	Disapprove somewhat	Neither approve nor disapprove	Approve somewhat	Strongly approve	Can't say	Prefer not to say

If you wish to elaborate on your approval/disapproval of the ETH air travel project, you may do so here (optional):

Are you personally willing to reduce your own professional air travel in order to reduce greenhouse gas emissions and/or in order to comply with the ETH air travel project?

No

Yes

Yes, by the following amount (in percent, not binding):

Can't say

Prefer not to say

Has the ETH air travel project influenced the frequency of your own professional air travel so far?

No, I fly as much as before

I fly as much as before, but because of the project I think about it more/differently

Yes, because of the project I fly less than before

Yes, because of the project I fly more than before

Can't say

Prefer not to say

Has the ETH air travel project influenced the frequency of your research group members' professional air travel so far?

No, they fly as much as before

They fly as much as before, but because of the project they think about it more/differently

Yes, because of the project they fly less than before

Yes, because of the project they fly more than before

Can't say

Prefer not to say

How important do you consider the issue of greenhouse gas emissions from professional air travel at universities?

Very unimportant	More unimportant than important	Neither important nor unimportant	More important than unimportant	Very important	Can't say

If you wish to elaborate on the importance/unimportance of the issue of greenhouse gas emissions from professional air travel at universities, you may do so here (optional):

Page 4 and 5 contained a list of arguments for or against reducing academic air travel. Participants were asked to indicate their agreement or disagreement with each argument. This part of the survey is not displayed here because it is part of an upcoming publication by Agnes Kreil.

Page 6

Thank you for completing the survey. Your responses have been submitted and you can close the window now without data loss.

Appendix C: Second survey

Page 1

Which department do you work at?

If several apply, please choose your primary affiliation.

Other (specification optional): _____

Which position(s) do you hold at ETH Zürich?

Please select any that apply.

- ☐ Student
- ☐ Doctoral student
- ☐ Postdoc (Postdoc & Wissenschaftliche*r Assistent*in II)
- ☐ Oberassistent*in (Oberassistent*in I+II & Wissenschaftliche*r Mitarbeiter*in)
- ☐ Senior scientist (Höhere wissenschaftliche Mitarbeiter*in/Senior Scientist/Titulary Professor)
- ☐ Professor
- ☐ Administrative or technical staff
- ☐ Other (specification optional): _____
- ☐ Prefer not to say

Are you a member of AVETH?

- ○ Yes
- ○ No
- ○ Don't know
- ○ Prefer not to say

Did you attend a virtual conference/symposium/networking event related to your work at ETH Zürich in 2019?

- ○ Yes
- ○ No
- ○ Don't know

Did you fly for your work at ETH Zürich at all in 2018 or 2019?

- Yes
- No
- Don't know
- Prefer not to say

How important or unimportant do you consider air travel to be for your work at ETH Zürich?

- Very unimportant
- More unimportant than important
- Neither important nor unimportant
- More important than unimportant
- Very important
- Can't say

Before this survey, had you heard of the ETH Zürich air travel project ("Stay grounded, keep connected") which aims to reduce ETH Zürich's greenhouse gas emissions?

- No
- Yes
- Don't know

Optional background information on the Air Travel Project

In early 2017, ETH Zürich launched a project aiming to reduce greenhouse gas emissions from professional air travel by ETH members. The departments, Executive Board, and administrative units at ETH Zürich each defined for themselves a reduction target per full-time equivalent and decided on measures for reaching it. Targets as well as measures vary between units. At the school level, the targets amount to a reduction of approximately 11% by 2025 compared to the average of 2016-2018. This includes flights taken by faculty and staff as well as flights taken by students as part of their curriculum.

In addition, the majority of the departments offset air travel emissions, with ETH Zürich joining the Federal Office for the Environment (FOEN) together with many other federal agencies. This compensation is not counted towards the reduction targets, but is an additional measure.

For more information, visit the project's website, on which this excerpt is based. If you would like to do so, please open the link in a separate tab or your survey progress will be lost.

Page 2

How did you learn about the ETH Zürich air travel project "Stay grounded, keep connected"?

Select any that apply.

- ☐ Attended an information event
- ☐ Received an e-mail from ETH or my department
- ☐ My superior told me
- ☐ A colleague told me
- ☐ ETH/AVETH social media
- ☐ Internal ETH news source (e.g., Globe)
- ☐ Other (please specify): _____
- ☐ Don't know
- ☐ Prefer not to say

Do you approve of the ETH Zürich air travel project?

- ○ Strongly disapprove
- ○ Disapprove somewhat
- ○ Neither approve nor disapprove
- ○ Approve somewhat
- ○ Strongly approve
- ○ Don't know
- ○ Prefer not to say

If you wish to elaborate on your approval/disapproval of the ETH Zürich air travel project, you may do so here (optional):

Had you already reduced your professional air travel for environmental reasons before you learned about the ETH Zürich air travel project?

- Yes
- No
- Don't know

Has the ETH Zürich air travel project influenced the frequency of your own professional air travel so far?

- No, I fly as much as before
- I fly as much as before, but because of the project I think about it more/differently
- Yes, because of the project I fly less than before
- Yes, because of the project I fly more than before

- Don't know
- Prefer not to say

Are you personally willing to reduce your own professional air travel (compared to pre-COVID-19 levels) in order to reduce greenhouse gas emissions and/or in order to comply with the ETH Zürich air travel project?

- No
- Yes
- Yes, by the following amount (in percent, not binding):
- Don't know
- Prefer not to say

If you wish to elaborate on your previous or intended air travel reduction, or lack thereof, you may do so here (optional):

How important or unimportant do you consider the issue of greenhouse gas emissions from professional air travel at universities to be?

- ○ Very unimportant
- ○ More unimportant than important
- ○ Neither important nor unimportant
- ○ More important than unimportant
- ○ Very important
- ○ Don't know

If you wish to elaborate on the importance/unimportance of the issue of greenhouse gas emissions from professional air travel at universities, you may do so here (optional):

Do you worry about any of the following as potential consequences if you reduced your professional air travel?

Please respond to this question regardless of whether or not you have reduced, or intend to reduce, your professional air travel.

- ☐ Missing opportunities to receive feedback on your work
- ☐ Not being perceived as an expert in your field
- ☐ Missing out on important information about what is going on in your field
- ☐ Missing opportunities to build personal relationships with colleagues from ETH Zürich
- ☐ Missing opportunities to build personal relationships with people working elsewhere
- ☐ Violating the obligations defined in your job profile
- ☐ Displeasing your superior
- ☐ Reducing your chances to have a successful future career
- ☐ Other (please specify): _____
- ☐ None of the above

Has COVID-19 changed your views on the issue of greenhouse gas emissions from professional air travel at universities in any way? (optional)

Is there anything else you would like to say about the topics covered by this survey? (optional)