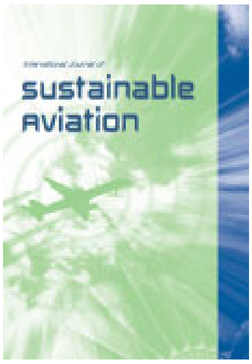

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Why fly electric? Stakeholder perceptions of e-plane knowledge, motivations and barriers

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Why fly electric? Stakeholder perceptions of e-plane knowledge, motivations and barriers

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Abstract: Electric powered aircraft, or e-planes, have become a reality with improved battery performance and more lightweight aerodynamic airframes. Given this technical feasibility, attention is turned to the first target market, flight schools. What is the level of e-plane knowledge, trust and interest among key stakeholders, managers/owners, instructors, and student pilots? A survey of stakeholders was conducted with 186 respondents. All stakeholder groups identified battery limitations as the strongest barrier. In contrast, motivations to fly e-planes differed across stakeholder groups as managers and instructors rated cost reductions as their strongest motivation while students rated reduced greenhouse gas emissions (GHGe) as the strongest reason. Quieter operations and reduced accident risk were rated more highly by managers than other groups. Future research and the associated dissemination of results that validate stakeholder motivations and address barriers are critical to overcome knowledge gaps and support the adoption of e-planes.

Keywords: electric aircraft; knowledge; benefits; barriers; stakeholder perceptions; flight schools; students; instructors; managers.

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1 Introduction

Electric planes became an approved aviation option in 2020 when the European Union Aviation Safety Agency, EASA, certified an electric two-seat airplane designed primarily for flight training. The new technology offers several potential benefits that motivate adoption, including reduced greenhouse gas emissions (GHGe), reduced lead emissions, reduced noise and reduced operating costs. However, barriers such as uncertainty or lack of trust in the technology, limited battery capacity, limited battery life and costs associated with battery replacement may limit its appeal. The rate of adoption of this new technology will depend on perceptions regarding how important these benefits and barriers are among key stakeholders. This study provides insights from surveys of four groups: managers/owners, student pilots, instructors and ‘others’. The results will identify similarities and differences in the perceptions of these stakeholders at flight training units and potentially influence e-plane adoption.

Flight schools are identified as an important first market for e-planes because they use small planes, have high usage rates (annual hours flown per airplane) and are an important source of skills to enable technical and operational change in the aviation industry. The introduction of electric propulsion technology early in training will give students the skills to manage electric battery systems as a foundation for them to take into the broader aviation industry. E-planes may also reduce the cost of training thus reducing the financial barrier to enter the pilot profession. This paper will set the context by starting with the global challenge to reduce GHGe from aviation and the entry of electric technology as a viable flight propulsion system. The literature on the expected benefits and barriers is reviewed and the objectives of this study presented.

1.1 Context and literature

Climate change impacts and the urgent need for global and local action to reduce GHGe is well documented (IPCC, 2021). The transportation sector generates 16.2% of global GHGe with aviation accounting for 1.9% of the total. The aviation percentage increases for carbon dioxide (CO2) emissions, 2.5%, and effective radiative forcing, 3.5%, because of the increased impact of emissions and the formation of contrails at altitude (Lee et al., 2021). Although aviation represents a small percentage of global emissions, it is expected to grow rapidly, 4.3%/yr. and action is required to change the direction of its emissions curve (ICAO, 2020). The Air Transport Action Group (ATAG) strengthened their Waypoint 2050 Report and gained industry endorsement of a net-zero carbon emissions target by 2050 at the 2021 global sustainable aviation forum (ATAG, 2021). This ambitious target requires the urgent development, testing, and adoption of low-carbon technologies. The International Aviation Climate Ambition Coalition held its inaugural meeting at the 26th Conference of the Parties to the United Nations framework convention on climate change and called on nations to advance ambitions changes in their aviation industry to meet climate targets, including ‘Promoting the development and deployment, through international and national measures, of innovative new low- and zero-carbon aircraft technologies that can reduce aviation CO2 emissions’ [UKCOP26 (2021) p.1].

Electric aeroplanes (e-planes) are one of the most promising solutions to the global aviation emission problem. The Roland Berger Roadmap to True Zero estimates that 15% of current aviation emissions could be cut with pure e-planes and another 15% cut with hybrid electric planes (Sachdeva 2021). Over 200 e-planes are under development with aerodynamic design, lightweight composite materials, and more efficient electric propulsion as means to cut GHGe, lead emissions, and noise (Coren 2020). Replacing conventional fossil-fuel powered aircraft with e-planes would eliminate in-flight emissions, thereby providing deep reductions in GHGe (Gnadt et al., 2019; Moua et al., 2020; Justin et al., 2020; Borer et al., 2016; Thapa et al., 2021). This technology is not yet at the commercial airliner scale, however, integrating e-planes into operations that use small planes, for example flight schools, would create an opportunity to test, validate and further develop the technology.

Flight schools are a special case when considering the battery limitations of the first generation of e-planes. Unlike long haul flights where planes are expected to fly for many hours, training flights at flight schools typically last only one hour. Each lesson includes time for a ground briefing and inspection before and after. The training environment thus consists of planes making a series of one hour flights so the pattern of an e-plane needing one hour charge periods between one hour flights can be readily accommodated. The specialised flight school market thus offers an excellent first market for e-planes to get established while the battery performance increases for longer duration markets in the future.

The Pipistrel Velis Electro, a two-seat electric aircraft, officially certified by EASA, the European Union Aviation Safety Agency, in June 2020 fits this profile of one hour charge and one hour flight (Pipistrel, 2020). It became the first fully electric aircraft in the world to be type certified (EASA, 2020). The strength of aviation industry interest in this e-plane technology was demonstrated in March 2022 when Textron, the owner of established aviation brands Cessna, Beechcraft and Bell, announced their intention to acquire Pipistrel and accelerate its development of e-planes through a new e-plane division (Skies, 2022). Many other firms have announced their e-plane ambitions. In addition to the deep emissions savings, electric aircraft are expected to cut flight training costs for student pilots (Moua et al., 2020). However, before assuming that electric aircraft will succeed in the flight training market, it is important to understand the perceptions of key stakeholders.

An international study with 16,037 participants from 10 countries (Austria, Chile, France, Germany, India, Japan, Sweden, Switzerland, the UK, the US) found that 63% of respondents, think about the emissions created by their air travel, for work or personal reasons (Ansys, 2020). The majority, 89% of respondents, reported a willingness to pay more for greener air travel. E-planes were considered as an option by 60% of respondents because of their environmental benefits. Perceived barriers, or reasons that would prevent respondents from wanting to travel on an e-plane, included that the technology is not yet proven (49% of respondents) as well as concerns about the plane running out of battery, the battery technology failing or exploding, and expensive ticket prices. The need for additional pilot training was a concern to 17% of respondents while only 14% reported no concerns about electric flight (Ansys, 2020).

A national survey in Canada reported that half of the population agrees that now is the best time to be ambitious in addressing climate change (Nanos Research, 2021). In terms of broader aviation system emissions, Canada has over 10 airports that are recognised as working to reduce their carbon emissions (Airport Carbon Accreditation, 2021). In 2019, a world record was set in Canada when Harbour Air, a regional seaplane charter airline in British Columbia, flew the world's first fully electric commercial aircraft (Guardian News and Media, 2019). A fully electric propulsion system was retrofitted into a 1950's DHC de Havilland Beaver seaplane to complete the record flight. Harbour Air also announced its ambitions to retrofit all their aircraft to be fully electric and free of in-flight emissions. Another factor supporting a shift in aviation technology is the age of the fleet at Canadian flight schools. As of 2021, 60% of the singe engine flight training fleet and 67% of the multi-engine trainers were built before 1980 (Transport Canada, 2020). If these aging aircraft were replaced with e-planes, flight training carbon emissions would be reduced substantially (EIA, 2021).

2 Methods

Given that no e-planes were certified or used for training in Canada in 2021, this study examined self-reported perceptions to measure the importance of motivations and barriers among flight school stakeholder groups (flight school managers, student pilots, instructors). We particularly wanted to answer these questions:

1. How much do respondents know and trust e-planes?
2. What factors motivate respondents to want to fly e-planes?
3. What factors reduce respondent's desire to fly e-planes?

To answer these research questions, the authors sent email invitations to ten flight school managers in Canada and one in India (who had recently moved from Canada) to inform them about the study. When they agreed to participate, they were provided with a link to the electronic survey to forward to the students and instructors at their flight school. In total, 186 responses were received: 15 managers/owners, 117 student pilots, 35 flight instructors, and 19 others. Distribution by country was Canada 158 (85%), India 24 (13%), and other countries 4 (2%). Participation by gender was females 28 (15%), males 155 (83%), and gender not indicated 3 (2%).

The research instrument was developed using online Qualtrics tools. Ethics review and approval was conducted by the University of Waterloo's Office of Research Ethics, (ORE# 43089). An information and recruitment letter was distributed prior to the survey. The final survey consisted of 34 questions with most questions using a 0–10 graphic scale. The initial dial setting was 0 and represented 'not an important reason to me' (to want to fly e-planes), while 10 represented an 'extremely important reason to me'. Three open text boxes were provided to encourage the identification of other reasons to fly e-planes, or reasons to not want to fly e-planes, or to add further comments. Each respondent remained anonymous, so a number was assigned to each file and this number was used to identify sources when a quote from the comment box was used to illustrate the topic being discussed.

The analysis was conducted using statistical tools within the Qualtrics.com platform. The formula used to calculate means is (Qualtrics 2022):

$$\text{Mean}(\mu) = \left(\sum x\right) \Big/ n$$

where

μ is the mean of responses

$\sum$ means 'sum of'

x is a value of the response

n is the number of responses

The formula to calculate standard deviations (SD) is

$$\text{Standard deviation(SD)} = \text{square root of } \left(\sum |x - \mu|^2 / n\right)$$

where

$\sum$ means 'sum of'

x is a value of the response

μ is the mean of responses

n is the number of responses

A systematic limitation was identified. The default setting on the 0-10 graphic scale was 0. For questions where 0 was a likely choice (for example, when many participants chose values of 1 or 2), there was a lower total number of responses. This implies that some respondents may have assumed that their reply was 0 even if they did not touch the scale, but the computer may have recorded it as a skipped question. As a result, the number of respondents selecting 0 was likely underreported and a higher average value would have been calculated for that question.

3 Results and discussion

The responses of respondents to the 34 questions in the survey are presented in the results section with key attributes discussed in the text and the numerical summary of responses for each question presented in a series of tables. The first section presents the reported level of knowledge and trust regarding e-planes. The second and third sections then examine the perceptions of reasons to want to fly an e-plane, or reasons not to want to fly an e-plane, respectively. Finally, feelings of guilt regarding GHGe were considered in the context of the reported high motivation to cut emissions as a reason to fly.

3.1 Knowledge and trust

Knowledge about a new technology is essential before it can be adopted. Therefore, participants were asked about their level of knowledge about e-planes. In general, knowledge was limited (mean value of 3.7 on a 10-point scale, Table 1). Students reported the lowest average level of knowledge (3.3), with instructors reporting a slightly higher level (4.0) and then managers higher again (4.7). Finally, the group who classified themselves as 'other' reported the highest level of knowledge, although it was still limited (5.0). This may indicate that the group of 'other' respondents had a higher level of knowledge and higher associated interest in e-planes and thus chose to participate in the survey when they saw the announcement of a survey link by the flight school. This cohort likely consists of certified pilots who were recent graduates or were still affiliated with online aviation student groups. One member of this cohort explained the reason for their interest 'If operating costs are less than normal avgas planes, I would look at one as my lodge and house are both solar powered, currently 100% solar power 9 months of the year. I fly the most in the summer.' (Respondent 173). The implication is that the 'other' cohort may include respondents who not only report being more knowledgeable about e-planes but may also be early adopters of other clean energy technology such as photovoltaic solar panels.

Table 1 How much do you know about e-planes? by cohort

	All	*Student*	*Instructor*	*Manager*	*Other*
e-planes					
Mean	3.7	3.3	4	4.7	5
Std. dev.	2.8	2.6	2.6	3.7	2.9
n=	179	112	34	14	19
e-planes for training					
Mean	3.1	2.7	3.6	4.1	3.7
Std. dev.	2.7	2.5	2.7	3.5	2.8
n=	117	67	27	12	11

Note: 0 = none at all, 10 = complete knowledge

The second knowledge question was more specific. It asked participants to rate their knowledge about e-planes for flight training. As expected, the knowledge about this specialised type of e-plane (3.1) was lower that for e-planes in general (3.7) Table 1. All four cohorts followed this trend of less knowledge about e-planes for training. Students registered the lowest level of knowledge again (2.7). Managers/owners reported the most knowledge among the four cohorts (4.1), but this was still only a moderate level on the 10-point scale.

Table 2 Level of trust, by cohort

	All	*Student*	*Instructor*	*Manager*	*Other*
E-plane technology					
Mean	6.0	6.1	6.1	5.3	5.8
Std. dev.	2.4	2.4	2.7	2.3	2.2
n=	177	111	34	15	17
Aviation safety authority					
Mean	7.5	7.8	7.3	6.1	7.3
Std. dev.	2.2	2.0	2.5	3.2	2.0
n=	183	116	34	14	19

Note: 0 = none at all, 10 = completely

Trust is also an important factor for the adoption of new technologies. Respondents were asked to rate their trust in e-plane technology. Students and instructors reported higher average levels of trust (6.1) than the managers (5.3) Table 2. These trust ratings were higher than the knowledge ratings in the previous question. Given the important role of aviation safety authorities in certifying new technologies, the trust in these agencies was also measured. The levels of trust among participants were higher when they were asked about their trust in aviation safety authorities than it was in the e-plane technology. Responses to the two trust questions were consistent with students reporting the highest average level of trust (7.8) among cohorts while managers reported the lowest average level (6.1).

3.2 Desire to fly an e-plane

Respondents were next asked how much they would like to learn to fly an e-plane. Given the low level of knowledge and higher level of trust in safety authorities, it is noteworthy that all cohorts gave their most positive responses to this question, out of all the questions in the survey. Comments ranged from 'always fun to fly new aircraft' (Respondent 57) to 'I believe it will become the standard and all pilots will have to learn someday.' (Respondent 10).

Figure 1 Desire to fly and knowledge of e-planes, by cohort

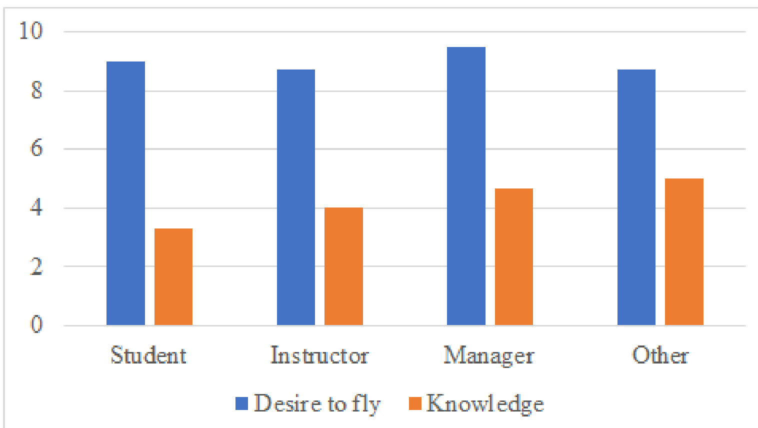

Table 3 Would you like to learn to fly an e-plane?, by cohort

	All	*Student*	*Instructor*	*Manager*	*Other*
Type certified					
Mean	8.9	9.0	8.7	9.5	8.7
Std. dev.	2.1	2.2	2.2	1.0	1.7
N =	180	113	34	15	18
Experimental					
Mean	8.0	8.3	7.5	7.7	7.9
Std. dev.	2.8	2.7	3.1	3.2	2.4
N =	177	113	33	15	16

Note: 0 = not at all, 10 = definitely

When asked if they would like to learn to fly an e-plane that had been officially certified, all four stakeholder groups gave extremely strong positive responses Table 3. The average response from students was 9 out of 10. As one student from New Brunswick commented, 'I think e-planes and the idea of them is super cool, and I'd love to fly, and one day maybe own one.' (Respondent 37). Managers gave an even higher average rating of 9.5. One flight school manager from Alberta explained that in addition to 'reduced fuel and maintenance costs', there were 'advertising and marketing' reasons to fly e-planes (Respondent 186). Another Canadian manager noted the acoustic benefits 'less noisy inside and outside the aircraft' (Respondent 184). Clearly the managers were motivated by multiple reasons to want to fly an e-plane. The instructors and 'other' cohort gave a slightly lower average rating (8.7). An instructor from Waterloo expressed the majority view, 'They're new and exciting.' (Respondent 106). Figure 1 illustrates that despite the limited knowledge about e-planes, all cohorts had a very strong desire to learn to fly an e-plane.

Learning to fly an experimental e-plane was also rated very highly with students giving the highest average rating (8.3) and instructors the lowest (7.5). An older instructor illustrated the minority view, 'Not really interested in these new concept e-planes' (Respondent 98). The biggest decline in average cohort interest was among managers as they reported very high interest in flying a certified e-plane (9.5) and less interest in flying an experimental e-plane (7.7).

3.3 Motivations and barriers

To understand the motivations behind the high level of desire to learn to fly an e-plane, questions were asked regarding the importance of various factors. The ranking of factors overall was strongly influenced by the large student cohort, so differences among cohort averages were also noted Table 4. The strongest motivation reported by any cohort was the manager's rating of the potential to cut costs (mean = 8.5). 'Simpler electric motor means simpler maintenance as well.' (Respondent 73). Managers rated the potential for quieter flights as their second strongest reason (7.9), followed by cutting emissions at third (7.5) and increased safety at fourth (7.4). Instructors followed the managers' pattern of rating cost reduction the highest (8.0), but their second strongest reason was that e-planes were a technology of the future (7.7).

Table 4 Reasons to fly an e-plane, listed by mean value

	All	*Student*	*Instructor*	*Manager*	*Other*
Cut emissions	7.9	8.2	7.2	7.5	7.1
Reduce cost	7.5	7.3	8.0	8.5	6.9
Future tech	7.3	7.3	7.7	7.0	6.9
Quieter	6.9	6.8	6.7	7.9	6.9
Safer	6.0	5.8	6.0	7.4	6.1
Growing share	5.6	5.7	5.7	5.6	4.5

Note: 0 = not important, 10 = extremely important.

The ranking of student motivations was different than that of managers or instructors. Students rated cutting emissions as the most important motivation (8.2). The next highest student motivations were cutting costs (7.3) and flying a technology of the future (7.3). 'I believe it is the technology of the future, but don't think we're quite there yet.' (Respondent 83) The potential for increased safety was given an overall average rating of 6.0 with students, instructors and 'others' having similar perceptions. Only the managers rated the potential for increased safety as a higher motivation (7.4). All cohorts rated the likely growing share of e-planes in the aviation industry as the least important factor to them.

The barriers, or reasons for not wanting to fly an e-plane, had much greater consistency across cohorts than the motivations. Instructors, managers, and students each rated limited battery endurance the highest among their reasons to not fly an e-plane Table 5. Students and managers were also consistent with both cohorts rating the likelihood that oil-based technologies would continue to dominate the industry for their career as the second most important reason and a possible increase in costs as the third highest factor. In contrast, instructors rated battery safety as the second highest reason and the continued dominance of oil-based technologies as third. Battery safety was rated as the strongest reason for the 'other' cohort to not fly e-planes. For example, 'battery fire in flight could lead to an uncontrolled situation' (Respondent 13). The clear conclusion is that this study supports findings of earlier studies (Han et al., 2019) that batteries (endurance and safety) are the biggest perceived barrier and that flight school managers, students and instructors share this assessment. In the words of an Alberta respondent, 'I think the batteries' recharge time will be the most critical hurdle in using e-planes in a busy flight school' (Respondent 164).

Table 5 Reasons not to fly an e-plane, listed by mean value

	All	*Student*	*Instructor*	*Manager*	*Other*
Battery endurance	5.8	5.6	6.7	6.3	5.1
Oil tech continues	5.5	5.6	4.9	6.2	5.1
Battery safety	4.8	4.5	5.3	4.8	5.6
Increase cost	4.6	4.7	3.5	4.9	4.9
Increase accident risk	4.2	4.2	4.1	3.7	4.5
Not trust electric tech	3.7	3.4	4.1	4.3	4.5
Increase training time	3.6	3.4	3.2	4.0	4.9

Note: 0 = not important, 10 = extremely important.

Following the identification of the top motivations and barriers regarding the adoption of e-planes, their relative strength can be considered. The top motivation among all participants was cutting emissions rated an average importance of 7.9 while the strongest barrier was battery endurance rated at 5.8. This indicates a much stronger perception of the top motivation than the top barrier. Similarly, when related factors are considered, the positive motivation was stronger. For example, the potential to reduce costs (7.5) is rated much higher than concerns about increasing costs (4.6). Likewise, the perception of e-planes as safer (6.0) is higher than concerns about battery safety (4.8) as a reason not to fly e-planes.

The overall results are strongly influenced by the student perceptions because of the large number of student respondents. However, an examination of each stakeholder cohort reaches the same conclusion about the greater strength of motivations. The student rating of cutting emissions (8.2) is much higher than their rating of battery endurance and the continued use of oil-based technologies as reasons not to fly an e-plane (5.6). Similarly, the instructor and manager ratings of reducing costs (8.0 and 8.5, respectively) as a reason to fly is much higher than their rating of battery endurance (6.7 and 6.3, respectively) as a reason not to fly. Finally, the 'other' cohort repeated the pattern with the motivation to cut emissions (7.1) rated more highly than the barrier of concerns about battery safety (5.6).

3.4 Emissions guilt

Given the strength of the motivation to cut emissions, further questions were asked about any feelings of guilt that participants had regarding their carbon emissions. Students reported stronger feelings of guilt compared to instructors and managers in each of the three questions about their emissions: general emissions, general aviation emissions and emissions associated with flight training Table 6. Managers reported the lowest feelings of guilt. The 'other' cohort reported stronger feelings of guilt for their general carbon emissions and weaker feelings of guilt related to aviation compared to student pilots.

The emissions guilt pattern identified above is reported even more strongly among female respondents. On average, females reported higher guilty feelings about their general emissions (6.6 vs. 4.9) and training emissions (5.9 vs. 4.2) than males. Similarly, they rated cutting emissions as a stronger motivation to fly e-planes (8.8 vs. 7.7) than the males who participated in the survey. A female respondent from British Columbia added a clear reason for wanting to fly an e-plane, 'for ethical reasons, because of climate change' (Respondent 166). Given the strength of this response by female participants, the introduction of e-planes for pilot training might help to attract females to the profession by appealing as a solution to their emissions concerns.

Table 6 Guilty feelings about your carbon emissions, by cohort

	All	*Student*	*Instructor*	*Manager*	*Other*
In general					
Mean	5.2	5.3	4.9	4.2	5.7
Std. dev.	2.9	2.9	2.6	3.3	3.0
n =	146	93	26	12	15
General aviation					
Mean	5.3	5.7	4.9	4.4	4.3
Std. dev.	3.0	2.9	3.1	3.7	3.2
n =	139	87	26	12	14
Flight training					
Mean	4.5	4.8	4.3	3.3	3.9
Std. dev.	3.0	3.1	2.7	2.5	3.1
n =	133	83	23	12	15

Note: 0 = no guilty feelings, 10 = very strong feelings.

4 Recommendations and conclusions

> "I believe electric operated vehicles are the way of the future and the more that we as individuals show interest in the technology, the more cost efficient, powerful, and environmentally friendly electric powered vehicles and machines will become. Where can I test e-planes?" (Respondent 12, student pilot from New Brunswick)

Flight school stakeholders are clearly interested in e-planes. Despite low levels of knowledge about e-planes (3.7 on a 10-point scale), respondents trust the aviation safety authorities that certify aircraft (7.5) and have a strong desire to learn to fly an e-plane (8.9

for a certified e-plane). To address this knowledge gap, e-plane research should be increased, and the results disseminated to provide stakeholders with the information needed to decide whether to adopt the new technology. Multiple communication channels (including publications, conferences, industry reports, media, social media, flight school demonstrations, air shows) should be used to inform diverse stakeholders.

Participants in the survey demonstrated that different stakeholder cohorts place different levels of importance on reasons to fly an e-plane. The most important reason among student pilots was to reduce emissions while the most important reason among instructors and managers was to reduce costs. These differences should be recognised when prioritising information to be shared with each cohort. While knowing the top reason for a stakeholder group is important, they also ranked other reasons as having high importance (7 or above), so there is a need to share multiple types of information. For example, information to students could start with the reduced emissions performance, but also include cost savings and developing skills for technologies of the future. Similarly, reports to flight school managers should start with cost savings projections, but also include emissions, noise, and safety information.

The perceptions of barriers or reasons not to fly e-planes were largely consistent across stakeholder cohorts with the limitations of batteries (endurance and safety) being the most important. Improvements in battery performance thus need to be shared as a top priority. Range anxiety was identified as a key issue or barrier to purchase among potential buyers of electric cars and trucks (Kester et al. 2019) and a similar pattern is found here with e-planes. Again, information dissemination is considered a prime means to address this concern about battery performance. In addition, it can be noted that replacement batteries are expected to offer longer endurance as future batteries achieve greater energy densities. Since batteries will need to be replaced on a regular basis (after a prescribed number of charge cycles), the replacement battery is expected to improve e-plane performance as the other features of efficient electric motors and lightweight, aerodynamic airframe are well established and have long life expectancies. Similarly, longer battery endurance will enable e-planes to be used in the future for cross-country flight training as well as the initial training for basic manoeuvres, take-offs, circuits, and landings.

Students reported stronger feelings of guilt about their carbon emissions than managers or instructors. They also rated cutting emissions as the top reason to learn to fly e-planes. This highlights the opportunity to introduce electric aviation as a climate action that appeals to the next generation of pilots. This pattern is even stronger among female student pilots who reported stronger feelings of emissions guilt and stronger climate motivation to fly e-planes than their male counterparts. Given the current underrepresentation of women in the pilot profession, the introduction of e-plane technology that matches their values may help address social equity as well as environmental and sustainability concerns in the aviation industry.

Overall, providing e-plane performance results across multiple criteria (including emissions, cost, noise, appeal to diverse cohorts, safety, endurance) will help overcome the limited e-plane knowledge currently reported and reinforce motivations to fly electrically. Improved stakeholder-sensitive knowledge dissemination will thus help to increase the knowledge of stakeholders and to create a market for electric aviation to attract a new generation of talent to the industry. Flight schools can plan to attract students with e-planes that they strongly want to fly.

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