UNIVERSITY OF BIRMINGHAM

Navigating Future Flight

Societal Principles for Drones and Advanced Air Mobility in the UK

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Ready for take-off?

Public engagement to shape Future Flight technologies

The skies are changing. Innovation in aviation technology and a growing need for clean transport are driving the development of new forms of air transportation which could revolutionise regional connectivity, delivery logistics, and public services.

Together, 'Future Flight' technologies (see box) may herald a new era in mobility. Next generation drones can transport consumer packages, logistical supplies, medical equipment, and disaster relief, delivering essential supplies to remote or disaster-stricken areas. Their surveillance capabilities make them useful in everything from search-and-rescue operations, through to policing and farming. Technologies like electric vertical take-off and landing vehicles (eVTOLs) and regional air mobility (RAM) aircraft can reduce travel times, create more sustainable options for short hop flights, and improve accessibility to remote or poorly connected towns, cities, communities and regions.

Several trends underpin the development of Future Flight technologies. Advances in aviation, air traffic control, batteries, sensors and artificial intelligence (AI) make them viable and scalable. Governments are looking to reduce emissions from transport infrastructure. Public frustration with road congestion and poor public transport is rising. Many journeys have to be routed through central hubs such as London, making them complicated and time-consuming, while some UK communities depend on air and ferry transport, and others are stranded in 'transport deserts'. Simultaneously, the rise of the on-demand delivery economy has created a fertile market for next-generation logistics and transport services. As technologies are commercialised, the industry is expected to create jobs and unlock economic growth through productivity gains, such as those created by improved accessibility.

Reflecting that promise, over $17 billion of investment has poured into Future Flight startups over the past decade, according to data from Roland Berger, a consultancy[1]. UK Research and Innovation (UKRI) estimates that Future Flight technologies will support the creation of new markets worth over $675 billion by 2050[2]. In 2021, the European Union Aviation Safety Agency (EASA) predicted that urban air passenger services would be available on the continent within five years. A leading American eVTOL company, Joby Aviation, has said it aims to launch eVTOL 'air taxi' operations, starting in Dubai, from 2025[3]. Significant public investment has flowed into research and development alongside private capital.

What is Future Flight?

Definitions of Future Flight or Advanced Air Mobility technologies vary, but this report considers them to encompass:

- **Non-passenger-carrying drones:** unpiloted vehicles which vary in size but can carry much larger loads than those currently in use. They can also have a much larger battery size and longer flight range beyond the visual line of sight of their operators.
- **Electric Vertical Take-Off and Landing vehicles (eVTOLs):** new types of battery-powered aircraft that take off vertically, transporting small groups of around 6 passengers from short trips to journeys of up to 150 miles.
- The report will also take into account electric or hydrogen **Regional Air Mobility (RAM),** which encompasses electric, hydrogen or hybrid-electric conventional aircraft that take off horizontally, providing short-medium range journeys between fixed locations for over ten passengers.
- **Vertiports:** a dedicated landing and take-off facility designed for eVTOLs or drones typically including take-off/landing pads which are similar in size to those used by helicopters, alongside electric charging infrastructure and services for aircraft operation.

To harness the full benefits, and create skilled green jobs, Innovate UK and the Economic and Social Research Council (ESRC) have been supporting the development of Future Flight, while funding social science research to ensure safe and effective implementation that engages with social and community needs, expectations or concerns.

Responding to Public(s) and Community needs

The emerging industry still faces significant barriers. Its many manufacturers must prove that their technologies are safe, quiet and commercially viable. Aviation systems must be overhauled to accommodate new aircraft without obstructing existing flights. Regulations and standards are needed to ensure safe and responsible deployment. Initially, affordability is likely to inhibit widespread adoption. Public support will be crucial to the success of Future Flight technologies, systems and services.

People are likely to support new forms of air transport if they serve the public good, and are more sustainable than other alternative transport options, according to a 2024 public dialogue funded by UKRI, through the Future Flight Challenge[4], and led by the University of Birmingham, Sciencewise and Thinks. Those views were echoed by a complementary 2024/2025 survey conducted by YouGov[5] and commissioned by the University of Birmingham.

Two iterations of survey data collection were conducted: the first between March-April 2024[6] and the second between December 2024-January 2025 (report to be released). This report analyses the most recent data collected between December 2024-January 2025, except where specifically noted.

This quantitative and qualitative data collection showed a broadly positive public attitude. A majority of survey respondents (68%) felt the potential benefits of non-passenger carrying drones outweighed the drawbacks, and a narrow majority of (56%) felt the potential benefits of eVTOLs outweighed the potential drawbacks. Publics[7] saw benefits in using drones and eVTOLs particularly when they:

- **Benefit public services,** by reducing the cost and increasing the efficiency of emergency services.
- **Increase connectivity to remote communities,** or towns and cities poorly served by existing infrastructure connections.
- **Boost the sustainability of UK transport systems,** by reducing fossil fuel use, particularly in aviation.
- **Strengthen economic opportunities in the UK,** by creating new green jobs in areas such as manufacturing, piloting, and airspace management.

However, one in three survey respondents (32%) felt the drawbacks of non-passenger carrying drones outweighed the benefits, rising to 44% when asked about eVTOLs. The UK public has serious concerns about safety, cybersecurity, air congestion, the impacts on biodiversity and wildlife, the costs of these technologies, and the potential for social exclusion.

Survey respondents viewed Future Flight solutions to be a lower priority investment in relation to other forms of ground-based sustainable transport, although they are more supportive in areas where they are not replacing extant services. When asked which was a higher priority in terms of overall transport development and investment in the UK, over the next ten years, 42% felt investment in existing transport infrastructure (e.g. rail and road) should be prioritised compared to 9% who felt investment in new transport technologies (e.g. eVTOLs) was a higher priority. However, 48% felt both were equally important.

Table 1 below shows the types of transport development and investment which publics consider a high, low or not a priority. Public dialogue participants wanted Future Flight technologies to be prioritised over other modes of transport only if there was a proven positive environmental impact, or if Future Flight could deliver other benefits, such as to connectivity and accessibility, that investments in existing transport technologies could not.

Table 1: **Transport development and investment priorities - UK views.**

Types of Transport Development and Investment	High Priority	Low Priority	Not a Priority
Electric buses in towns and cities	64%	21%	9%
Improved pedestrian networks	61%	25%	8%
Electric buses in rural or remote areas	53%	27%	12%
High speed train networks	52%	28%	13%
Electric/Hydrogen Trains	51%	26%	11%
Electric freight (e.g. Heavy Goods Vehicles)	49%	26%	13%
Trams in cities and towns	48%	31%	12%
Improved cycle networks	46%	29%	18%
Electric cars	42%	31%	20%
Electric or hydrogen flight in remote, isolated or rural areas	39%	32%	16%
New road building	37%	38%	15%
Electric or hydrogen regional flight (e.g. Electric aircraft transporting passengers between different regions, towns, and cities in the UK)	32%	34%	22%
Drones for transporting goods	29%	40%	22%
Electric flight within towns and cities	22%	34%	34%

Q1. Thinking about transport within the UK, for each of the following types of transport development and investment, please tell us whether you think it should be a high priority, low priority or not a priority over the next 10 years. Base: All (n =3,588)

For example, survey participants were less supportive of eVTOL services if they felt they were replicating existing public services or transport routes. There were higher levels of perceived benefits for transporting people between towns and villages in isolated or remote areas of the UK (77%) or in between cities and towns in rural areas of the UK that are not currently well-served by public transport services (55%). However, the lowest level of support for eVTOLs services was where they might operate between cities or towns in locations that are well-served by public transport (38% not beneficial to any community in the UK) or between cities or towns in locations that are well served by road links (36% not beneficial to any community in the UK).

Table 2: **Future Flight: 14 principles for development and deployment, developed by UK publics**

1	Future Flight technologies must be used for public good – they should only be rolled out if there are more positive impacts than negative for society as a whole.
2	Transparent and independent research and testing must be carried out to make sure that policy and regulation for Future Flight technologies aligns with these principles.
3	The development of Future Flight technology and services must involve collaboration with specialists and the public.
4	Future Flight developers and operators must be held to account by independent bodies.
5	Future Flight technology and development must be transparent.
6	The roll-out of Future Flight technologies must be properly resourced.
7	The UK as a whole must benefit from leading in Future Flight technologies, behaving ethically through international cooperation.
8	Future Flight technologies must be managed safely and held to the same level of, or higher, safety standards as existing technology.
9	Flight paths must limit the negative impact of noise pollution and visual congestion on people.
10	Future Flight vehicles and operations must be designed with accessibility in mind from the start.
11	Future Flight services must be affordable to the public.
12	Limiting negative impacts of Future Flight on wildlife must be a priority, avoiding tick-box exercises.
13	Future Flight job opportunities must be available in a fair and accessible way.
14	The use of drones for surveillance must be proportionate to the level of the potential threat, with clear guidelines.

Regarding drones, survey participants saw beneficial use cases in supporting emergency services (90%) and providing more convenient access to services for those living in isolated areas (89%). A majority also saw benefits in the delivery of medical supplies, tests or blood samples across all locations (55% in urban, 58% in suburban, 69% in rural and 70% in remote locations). However, only 35% felt drone delivery of parcels or packages to households in urban locations would be beneficial, compared to 55% for rural or 59% for remote locations. This is likely in part as urban communities are already considered well-served in terms of deliveries and related services.

These responses indicate that the evolving Future Flight industry faces meaningful public opposition or concerns and highlights the difficulties it is likely to face as technologies are commercialised. Sustained public engagement and transparency will be vital in building trust, buy-in and consensus, which should be integral to the sector's development. To this end, citizens involved in the public dialogue deliberated over four months to develop a framework for the roll-out of Future Flight services, resulting in 14 high-level recommendations which emphasise public good, inclusivity, sustainability and transparency[8] (see Table 2 and reference for full methodology and findings).

If government and businesses want to successfully build public support, and avoid backlash against deployment, these principles should serve as a guiding framework for the safe development, integration and scale-up of Future Flight technologies.

Failure to engage the public, in contrast, carries serious risks. Consider other sensitive emerging technologies, from ride-hailing apps to facial recognition, which have been rolled out without robust public discussions or governance frameworks, triggering public anger and controversies. In fields such as AI and social media, regulators have struggled to keep pace with technological developments, or hold technology giants to account as the risks associated with their services become apparent.

The Future Flight industry and the UK government have the opportunity to chart a different course. By engaging UK citizens, alongside key societal or environmental stakeholders, and establishing strong governance frameworks now, governments can lay the groundwork for the safe, sustainable and equitable deployment of new air-based transport and delivery services. Prioritising funding or support for services that provide a clear public good, such as public service routes, high-risk critical infrastructure maintenance, environmental monitoring, National Health Service (NHS) transport or other conservation and humanitarian functions, may be a way for governments to build trust and align the industry with public values, needs and expectations, whilst also supporting the economic opportunities for the UK that this sector offers.

A pre-emptive approach to consultation and regulation mitigates potential conflicts, and sets the ground for responsible, accountable and transparent innovation. The challenges posed by Future Flight are significant, but a well-coordinated approach, informed by social research, public engagement and guided by shared principles, can position Future Flight technologies as transformative tools for public good.

Chapter 1: Safety and inclusion

Safety

Future Flight technologies have a number of use cases in safety and security, ranging from medical deliveries to support for emergency response and disaster relief. The UK public is optimistic about many of these applications, reinforcing the notion that they support Future Flight when it serves the public good.

Overall, 90% of survey respondents saw drones and 86% saw eVTOLs as beneficial for providing support to emergency services, such as search and rescue, air ambulance, fire services and motorway accident response. The majority thought that drones would be helpful for delivering medical supplies, with 55% thinking this would be beneficial in urban environments, rising to 70% in more remote locations in the UK.

Drones can inspect infrastructure or equipment in hard to reach or high-risk environments (e.g. powerlines, offshore wind farms, railways and roads), reducing the need for dangerous human inspections; 78% of respondents felt drones would be beneficial in this respect. In the UK, this might include inspecting offshore and remote wind infrastructure.[9] Meanwhile, 65% saw benefits for police surveillance in urban locations but this was seen as slightly less beneficial in sub-urban, rural and remote locations. Similarly, eVTOLs were seen as most beneficial for disaster relief, particularly in remote (66%) and rural (67%) locations.

Yet the UK public is also deeply concerned about the safety risks of Future Flight, illustrating tensions at the heart of how these technologies are seen. The biggest perceived risk overall to drones was cybersecurity, with 85% of survey respondents citing concerns, for example, from hackers attacking vehicle operating systems. A significant majority, 74%, expressed concern about the technological safety of drones. A majority was also concerned about mid-air collisions and crashes (76%). We found similar levels of concern about safety with eVTOLs with key concerns listed as cybersecurity (79%), technological safety (77%) and collisions or crashes (75%).

Safety was, likewise, a top concern for participants in the public dialogue. They expressed particular reservations about the manufacturing and piloting of Future Flight aircraft, and the risks of future autonomous flights. They feared that an increase in the number of vehicles in the sky might lead to more collisions between existing aircrafts, buildings and birds.

After learning about existing aviation safety standards for higher airspace, in which RAM would operate, the participants were somewhat reassured. However, they were still concerned about the safety of lower airspace, where drones and eVTOLs would fly. This space is currently unregulated and used by hobbyists such as hang gliders. Notably, eVTOLs and next-generation drones would be taking off and landing in locations not previously reserved for aircraft, causing new complexities for air safety and airspace management.

There was strong opposition to autonomous passenger flights, with participants worrying about the safety implications. Overall, 62% of survey respondents were less likely to fly in an electric air vehicle with no pilot onboard,[10] indicating they would not be comfortable with autonomous services even if there was human oversight on the ground. Similarly, public dialogue participants were concerned about system failures or unforeseen collisions (e.g. with birds) with no pilot on board to take control.

Concerns may relate to safety issues, like system failures or bird collisions, but also to trust in other passengers. When asked about ridesharing with people they didn't know in an autonomous eVTOL, 28% said they would feel comfortable with a pilot onboard and 23% felt comfortable with a professional crew member onboard. The level of

comfort sharply decreased to just 8% who said they felt comfortable with no staff member onboard and 76% who felt uncomfortable[11]. Discomfort is slightly higher in female participants and those over the age of 35, increasing further in those aged over 55. Interestingly, 60% of people felt uncomfortable in ridesharing with strangers in on-ground motor vehicles. These findings suggest that it may not just be the risk of having no pilot onboard an autonomous air vehicle in an emergency that is a concern, but also how safe people feel sharing vehicles with strangers with no-one who can supervise or moderate their behaviour.

Separately, there were fears about hacking, crime and terrorism, especially related to drones (81% of survey participants were concerned about potential for use in criminal activity); this is unsurprising, as drones have already been deployed by criminal groups to deposit drugs, phones and weapons into UK prisons[12]. Public dialogue participants were concerned that bad actors could steal payloads, use drones to crash into buildings, carry illegal goods, or launch terrorist attacks. They also felt there needs to be a requirement for all drones to be identifiable, for example, through ID numbers and registration or markings/aircraft livery, so that operators can be held accountable for breaches.

Dialogue participants also expressed concern about the safety of batteries and, to a lesser extent, hydrogen, which would power Future Flight vehicles. They were unsure whether battery technology was ready to be used in aviation technology, particularly given reports of electric car batteries combusting. They were also unsure whether hydrogen, which is not yet widely used in transport, could be used safely in Future Flight vehicles.

When it comes to the question of surveillance, particularly by drones, dialogue participants were concerned about intrusions or voyeurism, such as the possibility of being recorded in their own homes. While some saw drones as a useful tool for police to gather intelligence and tackle crime, there were serious concerns about over-surveillance, particularly of marginalised communities. There was general agreement that while drone surveillance would serve the public good in some cases, such as helping police find missing people, there should be clear limitations to, and independent oversight of, their use. This is also reflected in our survey findings, with 79% concerned about invasion of privacy as a result of drone use.

Safety concerns may be addressed with strong regulation and safety protocols. Two-thirds of UK citizens (65%) said they would feel safe if Future Flight technologies received regulatory approval in the UK, such as via the Civil Aviation Authority (CAA), according to the national survey. 58% said they would be reassured if Future Flight technologies were compliant with internationally-recognised standards. Nearly half (48%) said establishing independent bodies or groups to provide oversight for decision-making around the use of these technologies in the UK would help them feel that Future Flight technologies are safe.

By contrast, assurances by industry or government are seen to be much less trustworthy than regulatory bodies, reflecting broader trends of declining confidence in public authorities. Under half (48%) said that evidence provided from testing by technology companies would make them feel safe, and only 36% say this about a government action plan for Future Flight operations in the UK.

Recommendations

Taking into account those concerns, Future Flight technologies must be managed safely and held to the same or higher levels of safety standards as existing technology. There was strong consensus among the dialogue participants that safety standards should be rigorously and universally applied to all operators, and that there should be robust training and licensing to fly Future Flight vehicles. This is endorsed in the survey as well: 83% of respondents considered it important to have a license to fly a non-passenger carrying drone, whilst 85% considered it important to have a license to fly an eVTOL.

On regulation, dialogue participants felt that developers and operators must be held to account by independent bodies on issues including safety, surveillance, social inclusion and accessibility. They stressed that these bodies must be funded independently to avoid bias, and supported meaningful sanctions for those who contravene safety rules or threaten national security. Participants wanted government, industry, academics and regulators, including the CAA, to work closely together to research safety and feed this into regulation and industry standards.

On surveillance, participants felt the use of drones must be proportionate to the level of potential threat, with clear guidelines and independent oversight put in place to ensure accountability and transparency over authorisation and operations. Separately, they felt that, as autonomous systems are developed, humans should remain in control and be accountable when things go wrong. This would mean having systems in place to enable human operators to take control of compromised vehicles.

Inclusivity

As with environmental issues and safety, Future Flight technologies pose both opportunities and risks for inclusivity. There is clear potential to address accessibility challenges and foster inclusivity, for instance by providing new means of transport for people of all ages living with disabilities, or chronic health conditions. Three out of four of the national survey's respondents felt that drones and eVTOLs could bring benefits to people living with disabilities (the figure was 78% for drones and 74% for eVTOLs).

Participants of the public dialogue felt that eVTOLs, particularly, could help people living with disabilities to travel further and faster than today's accessible transport allows. There was an understanding that as such technologies, services and systems are new and unconstrained by existing infrastructure, they should be more accessible than current modes of transport, and should be designed with diverse access needs in mind.

Future Flight technologies could improve geographical accessibility by connecting remote and regional areas with each other or with urban hubs. Rural and remote respondents were more likely to cite benefits from drones including connectivity-related factors. Survey respondents ranked investment in electric or hydrogen regional flight in remote, isolated or rural areas – which could use smaller regional airports and may not require urban construction[13] – as their top priority among Future Flight technologies.

Table 3: **UK survey respondents' benefits of drones by use case and region**

Use Case	Net: Beneficial			
	Urban	Suburban	Rural	Remote/ Isolated
To support emergency services response (e.g. search and rescue, fire services, motorway accidents)	63%	67%	74%	73%
Inspection and maintenance of infrastructure in hard to reach or high-risk environments (e.g. powerlines, offshore wind farms, railways, roads)	53%	56%	69%	72%
To support disaster relief within the UK (e.g. response to floods or wildfires)	55%	60%	73%	72%
Delivery of medical supplies, blood samples or tests	55%	58%	69%	70%
Farming and agriculture (e.g. smart farming, surveying and monitoring, disease detection).	21%	29%	74%	60%
Delivery of mail, parcels or packages to local collection hubs	40%	45%	57%	57%
Delivery of mail, parcels or packages to individual households	35%	41%	55%	59%
Police surveillance	65%	58%	55%	53%
Police monitoring of borders	40%	41%	50%	56%
Commercial movement of goods and materials	36%	40%	50%	51%

Q2. Listed above are some examples of the ways in which non-passenger carrying drones might be used. For each use listed, please indicate whether you think non-passenger carrying drones would be beneficial or not beneficial within different types of community in the UK. Please select all communities, if any, where you think this technology would be beneficial. Base: All (n =3,588)

Table 4: **UK survey respondents' benefits of eVTOLs by use case and region**

Use Case	Net: Beneficial			
	Urban	Suburban	Rural	Remote/ Isolated
To support disaster relief within the UK (e.g. response to floods or wildfires)	45%	51%	67%	66%
Transporting people between cities and towns in the UK that are not currently well served by public transport services (e.g. train, buses or ferries)	31%	38%	55%	55%
Transporting people between cities and towns in the UK that are not currently well served by roads links	29%	36%	53%	55%
Police surveillance or monitoring	46%	46%	47%	45%
To replace existing emergency services helicopters (e.g. air ambulances, search and rescue or coast guard)	34%	39%	49%	49%
Transporting passengers from international airports to their home or between connecting airports	31%	34%	37%	37%
For leisure or sightseeing activities	27%	28%	34%	36%
Transporting people between cities and towns in the UK that are currently well served by road links	24%	26%	29%	29%
Transporting people between cities and towns in the UK that are currently well served by public transport services (e.g. trains, buses or ferries)	22%	25%	28%	28%

Q3. Listed above are some examples of the ways in which electrical vertical take-off and landing vehicles (eVTOLS) might be used. For each use listed, please indicate whether you think eVTOLs would be beneficial or not beneficial within different types of community in the UK. Please select all communities, if any, where you think this technology would be useful. Base: All (n =3,588)

Despite the potential benefits, there were reservations about how accessible and inclusive technologies and services will be in reality. For example, the public dialogue heard concerns around wheelchair accessibility in relation to RAM, owing to their similarity to existing aircrafts. And while participants felt that the roll-out of eVTOLs and RAM should be targeted in under-connected areas, there was scepticism about this happening, given that demand in some sparsely populated areas may be low.

There were similar fears about economic inclusivity. Three quarters (78%) of the survey's respondents said they are concerned that eVTOLs will be too expensive for most people to afford, with 45% saying they are 'very concerned' about this.

Participants in the public dialogue expressed fears that eVTOLs and RAM would be available only to the rich, with everyone else experiencing only the negative side-effects like noise, air congestion, or the construction of new vertiports or drone hubs. They were particularly concerned about where these technologies and supporting infrastructure receive public funding from, and did not feel that taxpayer money should be allocated to supporting an industry unless it benefits most citizens. They felt that zero-carbon aircraft would be more expensive to operate than other public transport options, such as trains or buses, given the costs of building infrastructure, developing skills and technology, and the limited number of passengers that could be transported per flight.

Although participants agreed that services were likely to become more affordable over time, this did not allay their concerns about socio-economic accessibility. Participants stressed that to make eVTOL and RAM services affordable, prices would need to be comparable to or cheaper than current public transport options (e.g. trains and buses) or be significantly more convenient or sustainable than on-ground transport. Achieving the necessary scale presents its own challenges, as participants expressed concerns about noise pollution, crowded skies, privacy, and ecological impact, among other issues. This situation reveals a tension between the public's desire for affordability and the acknowledgment of potential trade-offs.

Recommendations

As new technologies, Future Flight vehicles and operations can be designed with accessibility in mind from the start; there was consensus that journeys should be fully accessible end-to-end, taking into account all disabilities, including non-visible ones.

Participants in the public dialogue felt that manufacturers should engage with charities, experts, and people living with disabilities to achieve full inclusivity. There was also concern about the possible impacts on non-users living with disabilities, health conditions or neurodivergence, including autism, who might be affected by noise and visual pollution. Participants felt the needs of these on-ground communities should be taken into account in planning decisions around acceptable levels of noise and visual congestion.

In terms of enforcement, there was support for a mandatory, independently enforced accessibility code of practice, which could include standards such as minimum width doorways for wheelchairs and training requirements for staff. Participants in the public dialogue generally argued that manufacturers and operators should absorb the additional costs of making vehicles truly accessible, and that those costs should not be passed on to service users.

On economic inclusivity, there was consensus that services should not only be available for the wealthiest, and should, at the least, be made widely affordable within ten years of deployment. Participants felt that if the industry and any supporting infrastructure or services was funded, even in part, by taxpayer money, there should be a concerted effort to deploy eVTOLs and RAM services in areas which currently lack transport provision.

Chapter 2: Environment and sustainability

Future Flight technologies present both environmental opportunities and challenges. While these innovations can advance environmental objectives such as conservation efforts, sustainable agriculture, and zero-carbon transportation, their environmental impact requires careful consideration.

Public dialogue participants emphasised that deployment should only proceed if these technologies are demonstrably more sustainable than conventional transportation methods. Additionally, they felt that protecting wildlife from adverse effects must be treated as a fundamental requirement rather than a box-ticking exercise.

Transport emissions and climate change

Transport accounts for more than a third of global CO_2 emissions from end-use sectors.[14] While some ground-based transportation services, such as buses and forms of micro transport, are being electrified, aviation is proving difficult to decarbonise. This is partly due to the challenge of scaling sustainable fuel solutions for long-haul flights.

Future Flight technologies can play a role in decarbonising aviation by providing sustainable short- and medium-haul flight solutions, as well as an alternative to ground transportation for goods. Drones may also help reduce the carbon footprint of the "middle mile" (i.e. transportation between distribution centres) and "last mile" of delivery. The latter accounts for about 5% of a company's supply chain emissions, a significant proportion at a global scale[15]. These technologies could boost public sector sustainability too. The 20,000 vehicles in the NHS fleet travel 460 million miles a year, directly contributing to the 36,000 deaths caused by air pollution annually[16].

A majority (62%) of the national survey's respondents expect drones to be used for the delivery of mail, parcels, or packages to local collection hubs, and 54% think they will be used for the commercial movement of goods and materials within ten years' time. As with delivery drones, eVTOLs could help lower transportation emissions. A smaller proportion of around one in four respondents thought it likely that their use will become widespread, with the exception of use by the emergency services (50%) and in isolated and remote areas of the UK (59%).

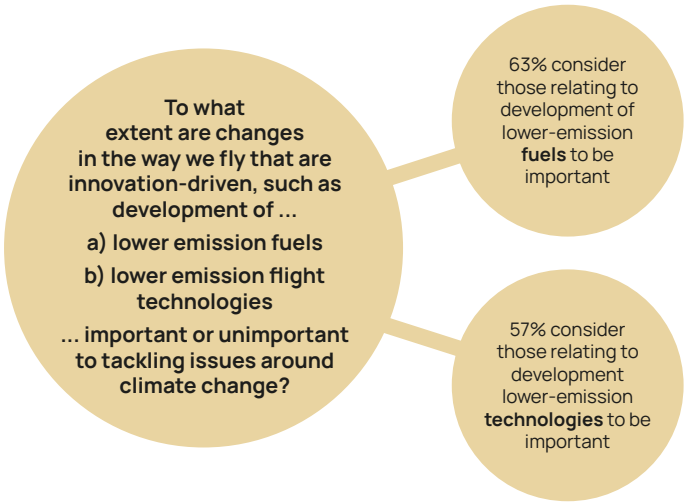
UK citizens are optimistic about the potential of Future Flight technologies to cut emissions. Over three-quarters of the national survey respondents felt that Future Flight technologies would reduce fossil fuel usage, with 76% believing drones and 73% believing eVTOLs would reduce road traffic. Similarly, many recognised potential environmental benefits, expecting drones (68%) and eVTOLs (66%) to help reduce air pollution.

Yet other responses showed more mixed views of the impact Future Flight technologies and innovation will have on climate change. A majority (57%) agreed that new technological developments will be fundamental to tackling the climate crisis. A majority (57%) said that innovation involving lower-emission flight technologies is important to tackle climate change, rising to 63% when they were asked specifically about the importance of lower-emission fuels. In contrast, 58% said that, in practice, technology and innovation primarily served corporate profits rather than environmental goals, suggesting scepticism about how much it can do to curb rising fossil fuel emissions.

Separately, participants of the public dialogue also expressed concerns about the true environmental impact of using batteries and hydrogen to fuel these technologies, and whether this would be more sustainable overall than other forms of transport. Take, for example, drone technology. Research suggests that in most cases, the energy

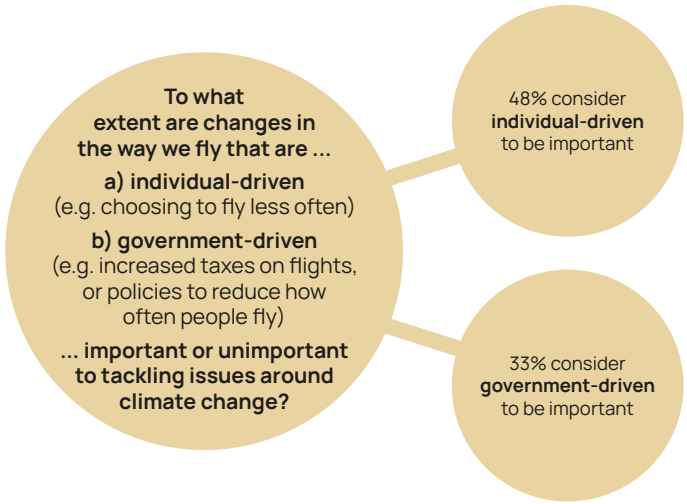
consumption of package delivery by small drones is lower than ground-based delivery. For larger drones, which require more power to carry heavier cargoes, the benefits become less clear-cut due to the need for frequent recharging[17].

Figure 1: **UK survey respondents' perception of importance of innovation-driven changes in tackling issues around climate change**



Q4. For each of the above statements about changes in the way we fly, please tell us to what extent they are important or unimportant to tackling issues around climate change. c) Innovation-driven changes, such as the development of lower-emission fuels for flight (e.g. biofuels, or other sustainable aviation fuels) d) Innovation-driven changes, such as the development of lower-emission flight technologies (e.g. electric and hydrogen planes). Base: All (n =3,588) NET: important

Figure 2: **UK survey respondents' perception of importance of individual and government-driven changes in tackling issues around climate change**



Q5. For each of the below statements about changes in the way we fly, please tell us to what extent they are important or unimportant to tackling issues around climate change. a) Individual-driven changes, such as choosing to fly less often b) Government-driven changes, such as increased taxes on flights or policies to reduce how often people can fly. Base: All (n =3,588) NET: important

Further, sustainability analysis will be vital to determining the most environmentally beneficial solution as technologies continue to develop for both on-ground and in-air transport. Furthermore, publics recognise that drones, like other electric vehicles, are only as clean as their power source.

Participants of the public dialogue were concerned about how electricity and hydrogen would compare to fossil fuels. Specifically, they wanted to know that batteries would be sustainably and ethically manufactured, whether they would use renewable energy, and be fully recyclable to ensure there are no hidden negative environmental impacts. They also wanted transparency around hydrogen's production, storage, and use.

Moreover, they questioned whether Future Flight services would replace or merely add to journeys being made using existing transport, since this would have implications for sustainability. They only saw the technologies as having a positive environmental impact if they replaced more polluting journeys, for example by plane or helicopter. Consequently, they felt that Future Flight technologies should be prioritised over other modes of sustainable transport only if there was a proven positive environmental impact, once the entire supply chain of each mode is considered.

As Future Flight technologies such as battery-electric, hybrid, and hydrogen aircraft improve and potentially become viable for short-range travel, they may meet these criteria. But the national survey found that across transport infrastructure as a whole, there is currently a clear preference for more environmentally friendly forms of existing, ground-based public transport, including electric buses, pedestrian networks, and electric/hydrogen trains. There is also considerable social concern over flight-based transport overall, in light of current domestic and international aviation use, with 49% of respondents believing that as a society we should be flying less and only 21% disagreeing. Successful deployment of new electric or hydrogen forms of flight by governments and industry should address public concerns about climate impacts by providing robust evidence for the benefits and trade-offs for carbon reduction.

When it comes to governance, a strong majority (74%) supported increased government regulation of private companies to address climate change. Notably, 58% favoured legislation mandating the replacement of freight vehicles with electric alternatives. But this contrasts with a general lack of trust in the government, with 50% saying they do not trust national governments to serve the best interests and needs of the UK public (we explore this theme further in Chapter 3).

Recommendations

Public dialogue participants emphasised transparency as key in deploying Future Flight technologies for emissions reduction. They specifically expressed a desire for transparency around battery manufacturing, sustainable and ethical production methods, renewable energy usage, and full recyclability. They felt that hydrogen systems should demonstrate sustainable production, storage, and usage practices. Transparency will be essential in calculating the environmental and emissions footprint of Future Flight technologies across their lifecycle. Given the strong support for government regulation of private companies to address climate change, increasing government involvement in technology development is another recommendation.

We asked UK publics who they would trust to know Future Flight technology is safe, and who would be most reliable in accurately

explaining the impact of technological developments on society. Almost half (48%) trust evidence provided from testing by technology companies to show the technology is safe, while 32% trust plans for government investment in future research around these technologies. However, when asked about who would be most reliable in accurately explaining the impact of technological developments on society, researchers working at a UK university (75%) ranked top followed by government researchers (61%), researchers working in an industrial or privately funded research organisation (53%) and lastly, industry and private companies (41%).

Conservation and biodiversity

Drones have several use cases for environmental monitoring and surveillance. They can help us see into places that are difficult to access, such as rainforests, glaciers and the ocean. In Antarctica, scientists are testing a state-of-the-art autonomous drone, the Windracers ULTRA UAV, funded by by Innovate UK's Future Flight Challenge. Designed for extreme environments, the aircraft can safely gather environmental data across huge areas[18]. Drones also support aerial mapping, wildlife tracking, and enforcement against crimes such as illegal logging and poaching. In South Africa's Kruger National Park, for instance, they have transformed how rangers protect endangered rhinos, serving as a deterrent to poachers[19].

Drones can similarly be used to collect data on metrics such as the weather, rainfall and soil moisture, supporting more effective land management[20]. With their help, farmers can optimise planting, irrigation, or fertilisation, monitor crop growth, and conduct sustainability assessments. The UK public anticipates this as a common use case: 73% of national survey respondents believe that drones will be used for farming and agriculture support in the future. As climate change brings farming under pressure, and the global population grows, such assistance is likely to be increasingly important. Companies are also working with the water industry to deploy drones that monitor water quality in hard-to-reach areas,

assisting utilities to proactively respond to problems while protecting worker safety[21,22].

However, there are concerns about the negative environmental and biodiversity impacts of Future Flight technologies. Concerns about the impact of drones on animals, including birds and agricultural livestock, were shared by 80% of survey respondents, making it their third-most prevalent worry after cybersecurity and potential misuse in criminal activity. We find a similar level of concern around the impact on animals with eVTOL usage (77%). Survey respondents were also concerned about damage to habitats caused by the ground-based infrastructure of drones (67%) and eVTOLs (70%).

Participants of the public dialogue expressed similar concerns about potential harm to wildlife. They felt that with more aircraft in the sky, and in lower airspace, there would be considerable negative impacts such as collisions between wildlife and vehicles, noise and light pollution affecting behaviours such as migration, and new infrastructure leading to habitat destruction. This is currently an under-researched area but a there is some evidence of potential impacts. For example, a National Geographic study found that drones caused bears to run away and their heart rates to spike, suggesting that they may cause psychological distress[23]. Participants were also worried by significant gaps in research and feared that considerations around the safety of humans would eclipse a need to protect wildlife. There is therefore a need for further research on the impact of emerging aviation technologies on wildlife and other animals including agricultural or domestic animals and pets.

There was consensus among participants that more independent research is needed on how Future Flight impacts wildlife, and that experts should be involved in decision-making to limit the harm that these technologies and services may cause. There was also support for some limitations on where Future Flight vehicles should be flown to protect wildlife and biodiversity. Specifically, participants wanted flight paths to avoid migratory bird routes and areas of high biodiversity such as national parks.

Recommendations

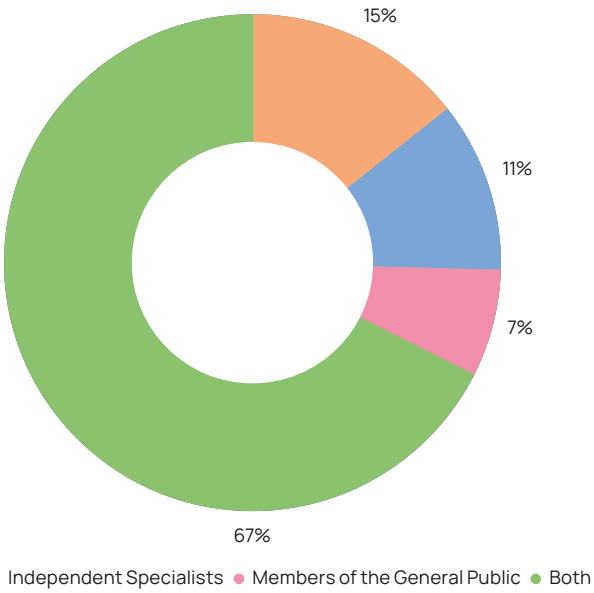
The public dialogue revealed strong views on wildlife policy in relation to Future Flight development. Participants emphasised that wildlife experts — particularly ecologists and conservation non-governmental organisations (NGOs) — should have greater authority than government and industry in related decision-making processes.

A key recommendation was the need for comprehensive, independent research on how Future Flight technologies affect wildlife. Participants noted that impact assessments must go beyond risks of collisions with birds to examine longer-term concerns like migration patterns and biodiversity. They advocated for environmental organisations to be involved from the start in informing regulation about wildlife and contributing to ongoing monitoring of the impacts of Future Flight infrastructure, operations, and services.

While participants expressed high levels of trust in environmental groups, they also called for balanced oversight to ensure wildlife protection would be weighed appropriately against other benefits and concerns. They specifically noted that livestock interests, represented by farmers, should be considered separately from wildlife conservation efforts.

The dialogue highlighted a clear desire for independent oversight bodies or equivalent mechanisms to hold industry and service providers accountable, a desire that extends to sustainability and wildlife impact, which is also supported by our survey findings. This reflects a broader public interest in ensuring Future Flight development proceeds with robust environmental safeguards, especially as commercialisation accelerates in the coming years.

Figure 3: **Importance of stakeholder input on the impact of Future Flight technologies on wildlife or biodiversity**



Q6. In the workshops held with members of the general UK public, they discussed how different groups in society may need to be consulted to get their views on a variety of issues related to the development of future flight technologies. For each of the issues listed below, please indicate how important or unimportant you think it is to consult each of the following groups: a) Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.) b) Members of the general public Base: All (n =3,588) Results: Impacts on wildlife or biodiversity

Chapter 3: Establishing the public good

UK citizens are likely to support technology if it serves the public good. A dominant concern of the public dialogue participants was that Future Flight services should only be rolled out if they have more positive impacts than negative ones on society as a whole. 73% of survey respondents similarly felt that it was important for benefits to the wider UK population, such as improving public services, economic growth, sustainability, and connectivity, to be prioritised, ensuring that potential benefits were not just delivered for a small group of private users.

Yet defining the public good is difficult. In some cases, for instance, where Future Flight services could save human lives or bring social and economic benefits to marginalised communities, the benefits are clear. Participants saw Future Flight as offering a public benefit in cases where it supported sustainability or improved public transport. But there were questions around how public good could be defined, monitored and quantified.

Moreover, participants doubted whether these technologies would serve the good of societies in practice. They pointed to HS2, a high-speed railway under construction in England, as an example of a publicly-funded project that has thus far failed to deliver predicted benefits. They were concerned that the benefits of Future Flight technologies would largely take the form of profits for industry and status boosts for politicians at the cost of taxpayer money.

To encourage a focus on public good, participants wanted the government to have oversight of Future Flight operations, but questioned how well this would be done in practice. The public dialogue and survey both show that distrust of government and industry are commonplace.

Public dialogue respondents offered two key ideas to help overcome this: the implementation of robust transparency mechanisms and the creation of independent oversight bodies or similar groups and mechanisms to serve as intermediaries between government, industry, and the public. Metrics for measuring and demonstrating "public good" may also be required to build public trust and interest in Future Flight services. To ensure that public opinion continues to be captured in policy, ongoing dialogue is essential.

The definition of public good often sparks debate, as different parts of society hold varying values and priorities. To navigate these differences, governments often use public consultation processes when evaluating controversial or potentially risky emerging technologies. These consultations gauge public sentiment, identify concerns, and gather diverse perspectives from stakeholders. The successful deployment of novel technologies relies on public support and trust, which can be strengthened through transparency and community engagement.

Public consultation on emerging technology has become increasingly vital amid concerns about the implications of advanced technologies and data collection for privacy, civil liberties, and public safety. Canada held a public consultation regarding a new legal framework for regulating police use of facial recognition technology[24] – an important area for debate about Future Flight technologies, given concerns about surveillance. New Zealand has made its proposed "Biometrics Code" available for public consultation in an effort to ensure biometric technology is implemented safely and fairly[25]. Similar consultations on Future Flight technologies may be needed, given the depth of concern about privacy and surveillance. Social science research methods are invaluable in illuminating the specific concerns of public groups to guide future targeted consultation.

For instance, Future Flight technologies share common hurdles with ground transportation, especially relating to public anxiety about autonomous systems. Almost half of the UK public (42%) would not support the future roll-out of self-driving cars and 30% would be less likely to support autonomous drones if they are flying beyond the visual

line of sight of their operators, according to our national survey. Our March-April 2024 national survey showed that 62% would be less likely to fly in an eVTOL with no pilot.

There are legitimate concerns about safety, trust in the technologies, and trust in other passengers, such as fears of harassment or assault; these concerns exist across autonomous transport modalities. Consultations will be important in addressing these understandable worries and could indicate the need for the presence of human pilots or oversight across all of these forms of transportation regardless of the technological capabilities of autonomous technologies.

Public consultation processes on autonomous systems are underway. The Australian government's National Transport Commission, for example, held a public consultation on a regulatory framework for autonomous vehicles[26]. It has proposed measures including the creation of an Automated Driving System Entity, which would be responsible for the safety of automated driving systems. The government of Ontario, Canada, has held consultations on autonomous vehicles with regional stakeholders. It developed a Readiness Plan with guidelines for autonomous vehicle pilot projects, encompassing issues such as data collection, funding, and modelling tools. Almost 80% of these guidelines were addressed in resulting pilot programmes[27]. Ireland has also taken steps towards understanding public opinion on autonomous transportation. The country's Department of Transport held a public consultation to gauge citizens' views on the principles that should guide a national strategy on connected and autonomous mobility[28].

A different model comes from Citizens' assemblies; an approach also used successfully by Ireland to address emotive issues such as gay marriage and abortion. Citizen assemblies are selected to be electorally representative and, after learning about complex issues, reach consensus, and provide recommendations to government. The model is becoming increasingly popular internationally, used on issues ranging from climate change response to health system reform[29]. France's Citizens' Convention on Climate, for instance, made some proposals that influenced aviation regulation, including a ban on short-haul flights when a rail alternative under 2.5 hours is available[30].

The UK has already established a framework for public engagement with policies relating to aviation and airspace, and recently launched a consultation on modernising its airspace[31]. It is seeking views on proposals to establish a UK Airspace Design Service, a new team of aviation experts that will attempt to improve the way aircraft move around the UK, to reduce delays, emissions and noise pollution. As emerging technologies like drones and eVTOLs prepare to enter our skies, a consultative approach will be vital to address concerns around issues such as safety, environment, and social good.

As part of a UKRI-funded research programme on public views of Future Flight technologies, and their possible uses, two public deliberative dialogues have already been held in the UK. The first dialogue involved a series of online webinars, activities and workshops with 72 participants during March and April 2022[32]. The second was an in-depth dialogue process involving a longer series of seven online and face-to-face workshops held with 43 participants from January to April in 2024[33]. Both deliberative dialogues involved members of the general public from across the UK and reflected the diversity of the broader population. They provided rich insights and engagement that could provide a platform for more targeted future public engagement initiatives to understand attitudes across social groups, set priorities, and monitor how perspectives evolve over time as Future Flight technologies, systems and services further develop.

In the 2024 public dialogue workshops, participants shared and debated how these technologies should be introduced, creating a set of guiding principles for their roll-out in the UK. While participants had mixed opinions on these principles, the questions outlined in Table 5 reflect the main ideas discussed.

Responses indicate engagement not just with regulation but a desire for a system of planning, governance and stakeholder engagement that is adaptive over time to provide continual guardrails and oversight as Future Flight technologies, services and systems are commercialised and scaled up. Participants developed fourteen principles they would like to see underpin the roll-out of Future Flight technologies. Subsequently, we have gauged the endorsements of these principles among wider UK publics through our December 2024 – January 2025 nationally representative survey, conducted by YouGov, which draws on 3,588 UK respondents' views (see Table 5).

Table 5: **UK survey respondents' endorsement of Future Flight principles in the nationally representative survey**

	Public Dialogue Principle	Related Survey Questions	NET Important (%)
1	Future Flight technologies must be used for public good – they should only be rolled out if there are more positive than negative impacts on society as a whole	Prioritisation of benefits to the wider UK population, and not just a small group of private users (e.g. improving public services, economic growth, sustainability, and connectivity)	73%
		These technologies should only be introduced if they are more sustainable than existing modes of transport	73%
2	Transparent and independent research and testing must be carried out to make sure that policy and regulation for Future Flight technologies aligns with these principles	Policy and regulation that is supported by evidence, established before roll-out and regularly updated	82%
		Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.) should be consulted on:	
		■ Safety regulation, including airspace and vehicle safety	82%
		■ Placement of flight paths	77%
		■ Impacts on wildlife or biodiversity	79%
		■ Levels of noise and visual pollution	76%
		■ Regulations around privacy (e.g. how recordings captured by air vehicles are stored and accessed) and data management (e.g. how personal data is stored and accessed)	79%
		■ Sustainability standards and practices (e.g. climate impacts)	73%
		■ Ensuring services are inclusive of those living with disabilities, health conditions, and neurodivergence	71%
3	The development of Future Flight technology and services must involve collaboration with specialists and the public	Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.) should be consulted on:	
		■ Placement of vertiports (areas that can support the take-off and landing of eVTOL aircraft) and drone hubs	74%
		■ Ensuring services are inclusive of those living with disabilities, health conditions, and neurodivergence	71%
		■ Ensuring services are affordable to the wider UK public	69%
		■ Oversight for use of drones in surveillance (e.g. by police or private security services)	76%
		Members of the general public should be consulted on:	
		■ Placement of vertiports (areas that can support the take-off and landing of eVTOL aircraft) and drone hubs	76%
		■ Ensuring services are inclusive of those living with disabilities, health conditions, and neurodivergence	74%
		■ Ensuring services are affordable to the wider UK public	72%
		■ Oversight for use of drones in surveillance (e.g. by police or private security services)	75%
4	Future Flight developers and operators must be held to account by independent bodies	Establishing independent bodies to monitor and hold industry accountable in key areas (e.g. safety, impacts on wildlife, accessibility, impact on the environment, and drone surveillance)	76%
5	Future Flight technology and development must be transparent	Information that is available and open to the public concerning Future Flight technologies in key areas (e.g. sustainability, funding, and supply chains)	72%
		Members of the public should be able to access information about how and where vehicles are being used	79%
6	The roll-out of Future Flight technologies must be properly resourced	Government and industry investment in skills and training, e.g. to operate aircraft, maintain vehicles and regulate use	74%
		Human oversight and accountability of non-passenger carrying drone operations (as opposed to fully autonomous without direct control of a human operator/operation)	74%
		Human oversight and accountability of airspace management (as opposed to fully autonomous without direct control of a human air traffic controller operations)	77%
		Human oversight and accountability of passenger-carrying eVTOL (as opposed to fully autonomous/without direct control of a human operator)	76%

Table 5 Continued: **UK survey respondents' endorsement of Future Flight principles in the nationally representative survey**

Public Dialogue Principle		Related Survey Questions	NET Important (%)
7	The UK as a whole must benefit from leading in Future Flight technologies, behaving ethically through international cooperation	Equal distribution across society of any economic benefits from these new technologies and services	71%
		Sustainable and ethical supply chains in the UK and internationally (e.g. in the production of vehicles, energy and land-based infrastructure)	72%
8	Future Flight technologies must be managed safely and held to the same level of, or higher, safety standards as existing technology	A requirement to have a licence to fly a non-passenger carrying drone	83%
		A requirement to have a licence to fly a passenger-carrying eVTOL	85%
		Safety standards that are held to the same level as those for existing aviation technologies and transport systems	84%
9	Flight paths must limit the negative impact of noise pollution and visual congestion on people	Flight paths that limit negative impacts of noise pollution	79%
		Flight paths that limit visual pollution from overcrowded airspace (e.g. from high numbers of low-flying vehicles)	75%
10	Future Flight vehicles and operations must be designed with accessibility in mind from the start	Accessibility of services for those living with disabilities, health conditions, and neurodivergence	67%
		Design that accounts for potential impacts on those living with disabilities, health conditions, and neurodivergence (e.g. on those living under flight paths, or near drone hubs)	68%
11	Future Flight services must be affordable to the public	Passenger-carrying eVTOL services must be affordable to the wider public, not just wealthy individuals, within ten years of the first commercial services being rolled out	71%
		Accessibility and affordability being conditions for operation of Future Flight services	68%
12	Limiting negative impacts of Future Flight on wildlife must be a priority, avoiding tick-box exercises	Taking into account potential impacts on wildlife (e.g. birds, insects, farm animals, habitats) when decisions are being made about Future Flight operations and services (e.g. site placement of vertiports [take-off and landing sites for eVTOL aircraft], flight paths, drone hubs)	75%
		Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.) should be consulted on:	
		■ Impacts on wildlife or biodiversity	79%
		■ Sustainability standards and practices (e.g. climate impacts)	73%
		Members of the general public should be consulted on:	
		■ Impacts on wildlife or biodiversity	74%
		■ Sustainability standards and practices (e.g. climate impacts)	67%
13	Future Flight job opportunities must be available in a fair and accessible way	Fair and accessible availability of any new job opportunities and training	74%
14	The use of drones for surveillance must be proportionate to the level of the potential threat, with clear guidelines	Establishment of independent oversight of drone use for surveillance (e.g. by police or private security services)	81%
		Guidelines and regulations for drone use for surveillance (e.g. by police or private security services) to ensure their use reflects the seriousness of the potential threat	82%

Q7. How important or unimportant do you think the following are in relation to the development of Future Flight Technologies (e.g. non-passenger carrying drones and passenger-carrying eVTOLs)?

Q8. Autonomous drones and eVTOLs are those able to operate and navigate with little or no human involvement, using advanced sensors and AI (artificial intelligence). How important or unimportant do you think the following are in relation to the operations of Future Flight Technologies (e.g. non-passenger carrying drones and passenger-carrying eVTOLs)?

Q9. How important or unimportant do you think the following are in relation to the operations of Future Flight Technologies, systems, and related services?

Q10. How important or unimportant do you think the following are in relation to the roll-out and operation of future flight technologies (e.g. non-passenger carrying drones and passenger-carrying eVTOLs)?

Q11./Q12. In the workshops held with members of the general UK public, they discussed how different groups in society may need to be consulted to get their views on a variety of issues related to the development of future flight technologies. For each of the issues listed below, please indicate how important or unimportant you think it is to consult each of the following groups:

- *Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.)*
- *Members of the general public*

Table 6: **Importance of input from specialists and the general public**

Issues Related to Development of Future Flight risk or issue	Independent Specialists	Members of the General Public
Safety regulation, including airspace and vehicle safety.	82%	75%
Regulations around privacy (e.g. how recordings captured by air vehicles are stored and accessed) and data management (e.g. how personal data is stored and accessed).	79%	79%
Impacts on wildlife or biodiversity.	79%	74%
Placement of flight paths.	77%	77%
Oversight for use of drones in surveillance (e.g. by police or private security services).	76%	75%
Levels of noise and visual pollution.	76%	79%
Placement of vertiports (areas that can support the take-off and landing of eVTOL aircraft) and drone hubs.	74%	76%
Sustainability standards and practices (e.g. climate impacts).	73%	67%
Ensuring services are inclusive of those living with disabilities, health conditions, and neurodivergence.	71%	74%
Ensuring services are affordable to the wider UK public.	69%	72%

Q13. In the workshops held with members of the general UK public, they discussed how different groups in society may need to be consulted to get their views on a variety of issues related to the development of future flight technologies. For each of the issues listed below, please indicate how important or unimportant you think it is to consult each of the following groups: a) Independent specialists (e.g. university researchers, charity groups, non-governmental organisations, etc.) b) Members of the general public Base: All (n =3,588)

Because of the risks, publics are slightly more likely to prioritise independant oversight and regulation, evidenced in endorsement levels for research and testing to ensure Future Flight roll-out has a net benefit to the public good (principle 2), accountability to independent bodies (principle 4), and managed safety (principle 8) over the factors of affordability and inclusivity. This shows the need to build public trust and the role of independent experts and social scientists in oversight and roll-out of a potentially large-scale critical infrastructure project that touches on many sectors and social concerns.

Wider consultations around Future Flight will be needed to address public concerns and build consensus on these technologies. In the public dialogue, participants strongly felt that members of the public, as well as relevant experts, should be given a say, and that this should be factored into decision-making. Survey respondents overwhelmingly agreed that independent specialists including academic researchers, charity groups and NGOs, should be consulted in the development of Future Flight technologies, especially on safety, privacy, data management and impacts on wildlife.

Input from the general public was also critical in these areas. Dialogue participants felt that further consultations were needed in a number of critical areas. This way, they felt the public could feed into the policies deemed most important, such as the use of drones for surveillance, providing a representative view to decision-makers at critical junctures in the roll-out of Future Flight technologies, systems or services.

Chapter 4: Policy recommendations

The UK public is likely to support Future Flight technologies if they serve the public good, and prove more sustainable than alternative transport options. But their openness to these technologies is tempered by serious concerns about environmental consequences, socio-economic exclusion, safety, accountability, privacy, and more. To support the safe and responsible development of these technologies, 14 principles were developed, discussed and refined by dialogue participants. These were then tested through national-level surveys, indicating endorsement by the majority of UK citizens. The following recommendations draw on these principles:

Public good: Future Flight technologies, operations and services should be prioritised for roll-out where there are more positive impacts than negative ones for society as a whole.

- These services should only be rolled out if they prove more sustainable than existing modes of transport, once the technology's full lifecycle and supply chain is factored in.
- Deployment should prioritise use cases that serve the public, including by improving emergency response and connectivity in remote areas, particularly if the technologies or any supporting infrastructure relies on public money.

Regulation: Future Flight developers and operators must be held to account by independent bodies or similar groups. And to ensure safe deployment, for the public good, regulation should be established before roll-out.

- Issues including noise, accessibility, impacts on wildlife, surveillance and safety should be regulated and monitored independently of industry or government.
- This would require the development of independent bodies or similar groups or mechanisms, additional to the CAA.
- These bodies should be independently funded through a tax on the industry, to ensure impartiality.

Safety: These technologies must be held to high, or higher, safety standards than existing technologies.

- Safety standards should be equal to or stronger than for existing modes of transport, be applied universally to all operators, and monitored by independent bodies.
- There should be robust training and licensing to fly Future Flight vehicles.
- There should be meaningful consequences for those who contravene safety standards.
- Drones should be identifiable, for example through ID numbers and registration or markings/livery, so that operators can be held accountable to safety protocols and to provide transparency to the public about drone usage trends.

Social inclusion and accessibility: Future Flight vehicles and operations must be designed with accessibility in mind from the start.

- Development should take into account all disabilities, including non-visible ones and neurodivergence, and all relevant identities including whether based on gender, ethnicity and race. That refers not just to access but also the economic opportunities unlocked by Future Flight industries.
- People living with disabilities, charities and experts on disability should be involved in the design, policy-making and decision-making processes taking into account the impacts on users and non-users.
- Manufacturers and operators should absorb the additional costs of making vehicles accessible.

Affordability: These services must be affordable to the public, and not only available to the wealthiest, and that should extend to the costs of training and upskilling to seize economic opportunities in Future Flight industries.

- Future Flight services should not cater only to the elite, especailly if they or any supporting infrastructure are funded by taxpayer money.
- If taxpayer money is involved, the roll-out of eVTOLs and RAM should prioritise areas with poor public transport connectivity.

Environment: Limiting the negative impacts of Future Flight technologies, on-ground infrastructure and services on wildlife and habitats must be a priority.

- Further independent research is needed on how Future Flight technology and services will impact wildlife.
- There should be limitations of where Future Flight vehicles can be flown, to protect wildlife and biodiversity.
- Experts need to be involved in decision-making to ensure that the impact on wildlife is taken into account in the roll-out of Future Flight operations.
- Consideration needs to be given to the impacts of visual pollution or congested skies on human and non-human species wellbeing.

Transparency: To judge how beneficial these technologies, systems and services are, there should be full disclosure on their sustainability and supply chains.

- This includes transparency around the sustainability and environmental impact of Future Flight vehicles; the safety of workers in supply chains; and the quality and safety of materials used in manufacturing.
- Public communication is critical to raise awareness about Future Flight technologies, and build knowledge of the risks as well as the benefits.

Collaboration and consultation: Specialists and the public must be involved in the development of Future Flight technologies, systems and services.

- Experts in relevant fields, NGOs, and the public, should be able to have their say in decision-making processes.

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6. All figures, unless otherwise stated, are from YouGov Plc. Total sample size was 3,279 adults. Fieldwork was undertaken between 28th March - 11th April 2024. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+).
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