

# CAA Response to 2021 Government Consultation on the Future of Transport Regulatory Review: Future of Flight

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# Introduction

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1. The Civil Aviation Authority (CAA) welcomes the Department for Transport (DfT)'s 2021 consultation on the future of transport regulatory review: future of flight. The CAA appreciates the opportunity to respond to this consultation and looks forward to working with the DfT and other stakeholders to evolve and adapt the regulatory framework for aviation to allow new technologies and services to be safely integrated into the UK aviation system.
2. Overall, the existing aviation regulation framework established in primary legislation already contains many powers to allow new and novel aircraft into the UK aviation system, where it is safe to do so. Nevertheless, some specific changes may be required, and much detail and reform in secondary legislation and associated guidance will be needed. Further, whilst aviation regulation is one necessary component, there are other potential regulatory and policy frameworks that may demand consideration to allow both the infrastructure requirement to support these services to operate, and for the potential externalities arising from such new services to be examined. These will be necessary to demonstrate societal benefits from these technologies, and to be able to garner public support.
3. Innovation in aviation has been relentless in the last few years. In common with all parts of the economy and society, the aviation and aerospace sector are undergoing significant technological transformation. Many of these changes are not based upon the linear progression of existing aviation technologies. As such, they present a unique challenge and potentially represent a fundamental shift in the underlying operational and economic models of the aviation market. This is an exciting moment for the sector, with the potential for significant economic and social benefits for the UK public if implemented successfully and if safety standards are maintained.
4. The CAA is conscious that the pace of innovation in aviation has significantly advanced. This advancement has been contributed to by a number of key trends including:
  - Growing interest in the application of a range of general-purpose technologies (such as electric motors, higher density batteries, digital connectivity) to aviation and aerospace use cases;
  - Policy determinations and legislative commitments to decarbonisation, which require both incremental and non-incremental technological development to deliver;
  - Significant capital investments in research and development of new aviation technologies from public and private sources (including Her Majesty's Government (HMG)); and

- New entrants joining the aviation and aerospace sectors, some of whom do not have previous operating experience in the field.
5. The CAA has been adapting to meet the new demands created by these innovations and new technologies. We have been doing so by designing mechanisms to better understand the technologies and services that are coming to market, and engaging with those developers to better inform them about the regulatory step they will need to undertake. Based on the learnings from those activities, we have also considered how the regulatory frameworks may need to evolve to allow these new services to be incorporated into the aviation system. This is in response to industry's signal that it needs regulation to advance faster than it has done in the past.
  6. Remotely piloted aircraft (RPAS); flights beyond visual line of sight (BVLOS); the transport of dangerous goods (DG) in RPAS; advanced air mobility (AAM) in urban and rural environments; new forms of traffic management; personal flight aircraft; hybrid craft that can be driven or sailed, as well as flown; and the need to effectively engage with the public, are among the many aspects of the future of flight the CAA has been actively working on for the last few years. Frequently, that work involves different levels of engagement with industry and the general public.
  7. The CAA sees this consultation as an opportunity for both the DfT and the CAA to learn more about the public's view on the future of aviation. At the same time, the result of the consultation could inform the DfT and the CAA about stakeholder's perceptions about the future of aviation.
  8. The CAA has the statutory responsibility to regulate many aspects of these emerging innovations when applied in novel aviation contexts. However, new rulesets and standards that underpin regulatory approvals might take longer to emerge due to the lack of maturity of some of the technologies, as well as the difficulty of integrating new and old technology. Further, many of the proposed use cases for these technologies require regulatory approvals not only from the CAA but also from other regulators, both within the UK and internationally. As such, the CAA does not own all of the regulatory frameworks which may pertain to a particular proposal. This consultation presents an opportunity to highlight some of these concurrent responsibilities.
  9. It is possible that further clarity might be needed regarding whether the DfT or the CAA have power to regulate certain new technologies and uses. In those cases, the CAA welcomes proposals to be granted more powers to regulate safety, security and economic aspects of innovation in aviation, aerospace and travel. The ultimate goal should be that the CAA is in a position to regulate relevant aspects of innovation in the sector in the short and long term.
  10. We welcome the DfT seeking opinions and evidence on what an innovative and flexible regulatory framework looks like for emerging technologies in the sector. The CAA agrees that it is time to address the challenges faced by new technologies,

based on evidence, through proportionate regulatory powers and, if needed, sanctions.

11. It must be recognised that we are in the foothills of innovation and new technologies in the sector. Many of these technologies are at a very early stage in both their development and their implementation within commercial scaled operations. It is therefore difficult to fully forecast what will be the economic, social and political dividends and disbenefits to be derived. We must recognise the imperfect state of our knowledge and the unpredictable transformative potential of these technologies. It must therefore be assumed that any regulatory approach must be iterative, will develop unevenly and will necessarily trail technological development – just as we have seen from other emergent technologies over hundreds of years. This will demand patience from understandably impatient stakeholders. However, we should not be afraid to engage with innovators and the public early and often, so as to enhance our understanding of those innovations, and in so doing build better policy.
12. It is also important to consider the structure of the regulatory framework. It is inevitable that no party can forecast the future. Therefore, creating regulatory frameworks that establish the core principles in law, and allow detailed requirements to be established through secondary legislation or guidance is the most suitable model for passing flexible regulation that can adapt to the evolving market.
13. While existing rules and guidance might be applied to some of these innovations, in the future the regulatory framework might look very different. This, as well as future formal and informal consultations from the DfT and the CAA, together with other forms of engagement with stakeholders, will help the CAA shape that future regulation.

# Response

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## Safety

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Question 1. In your view, are there any new or novel forms of flight that use UK airspace that may, as it currently stands, not fall within aviation regulation? If so, what are these new or novel forms of flight and how could we best ensure they are within scope of our current aviation regulation?

14. There are a number of generic titles grouping technologies such as electric vertical take-off and landing (eVTOL), powered lift RPAS, and hybrid air vehicles (HAV). Notwithstanding these innovative designs, operators and developers have a target purpose or use case. That purpose is the regulatory driver for the rule set. For instance, a light aeroplane could be used for private general aviation purposes, commercial air transport or specialised operations, such as aerial filming or a combination of each. The nature of each operation will necessitate a different regulatory approach, depending upon the quantum of risk to both those involved in the operation and the public.
15. Innovators interested in developing a new technology or in applying existing technologies to new problems or settings, will contact the CAA. That initial contact can take place in the form of an application before the Safety and Airspace Regulation Group (SARG) or, outside the CAA regulatory functions, via the Innovation Hub or other teams. In both cases, the applicant will notify their intended use of the technology to the CAA.
16. The CAA, in turn, will identify the existing applicable frameworks, if any, as well as consider those rules in process of being developed. Based on the preceding analysis, as well as on interactions with stakeholder and other evidence-gathering activities, the CAA might identify regulatory gaps or blockers. Those gaps and blockers might be potentially solved in the short, mid or long terms by producing guidance, interacting with other regulators, engaging in rulemaking or recommending that the DfT consider whether secondary or primary legislation may be required. On occasion, the lack of maturity of the technology, solution or the use case, might mean that an application is rejected or that the non-regulatory teams within the CAA decide to help the innovator by pointing out what specific aspects of their innovation need amendment to fit within the existing regulatory arrangements.
17. The CAA considers that many of the technologies which are being proposed for scaling within the sector such as RPAS, AAM and HAVs are within the

contemplation of the existing regulatory framework (primarily, secondary legislation, acceptable means of compliance and guidance material (AMC & GM), and general guidance, among others). While iteration on these frameworks will undoubtedly be required as both the underlying technologies and regulatory understanding matures, the CAA is already working on facilitating such operations.

18. However, two forms of technology that we have identified as not sitting cleanly within this structure are different types of wing-in-ground effect craft (WIG) and innovative personal flight (IPF). Early discussions and analysis indicate possible routes to operation.
19. Annexes 7 and 8 to the Convention on International Civil Aviation (also known as Chicago Convention) include a definition of aircraft. The UK Regulation (EU) No. 2018/1139 (known as the Basic Regulation), also adopts the Chicago Convention's definition of aircraft. That definition excludes machines that derive support from reactions of the air against the earth's surface. The purpose of the exclusion is to remove ground-effect vehicles (also known as wing-in-ground-effect, ground-effect crafts, wingships, flarecraft or ekranoplans) from the scope of aircraft-specific regulation. The International Maritime Organisation (IMO) issued guidelines for WIG (MSC.1/Circ.1592, dated 18 May 2018), which classify WIG in three types for certification purposes. This classification uses the 150-meter-above-the-surface threshold to determine whether the WIG is operating in ground effect or not.
20. While WIGs are currently being dealt with under maritime regulation, some WIG in the process of being developed by industry, as well as some proposed operations, will stray significantly into aviation. Any future discussions on WIG and similar craft by the DfT with international or domestic agencies or in other context should bear in mind that IMO guidance might not suit new craft and new use cases.
21. Regarding IPF, most of them are jet packs. They rely on air-breathing, jet propulsion; use of kerosene, diesel, paraffine or jet fuel (although tests with batteries are ongoing); have one pilot, who has little to no pilot protection; exclude the possibility of additional passengers; have limited to no access to navigational instruments; and often do not have wings. If an IPF uses air-breathing jet engines, it should normally be considered an aircraft, whereas if it uses rocket propulsion, the IPF is usually a rocket. Classified as aircraft, existing laws and guidance apply to IPF, depending on where, for what purpose and under which conditions the IPF system is flying. However, existing law and guidance was not enacted with IPF or jet packs in mind.
22. In addition to the safety issues, it is important to highlight that in the context of the development of new aircraft, the CAA has decided to no longer use the term *unmanned aircraft*, and replaced it with *RPAS*, which is more accurate. The CAA expects that the DfT moves away from the term *unmanned* or *unpiloted*, as it does not reflect how those aircraft operate, and it might be deemed gendered language.

Question 2. In your view, are the existing legal and regulatory frameworks sufficient to introduce new and novel aircraft in a safe way? If not, what changes are required?

23. The UK's State Safety Programme sets the safety standards for the UK, as defined by the Acceptable Level of Safety performance (ALoSP), with the aim that there are no serious injuries or fatalities to third parties as a result of aviation activities. This should be achieved through our State Safety Objectives, that:
- Protect people from aviation safety risks, including those in aircraft and on the ground;
  - Reinforce the UK position as a global leader in aviation safety; and
  - Positively influence aviation safety through collaborative working with our international partners.
24. These objectives apply as equally to new and novel aviation as they do to existing aviation.
25. The CAA has mechanisms to allow the safe testing and trialling of novel technology through approvals for experimental aircraft (known as E Conditions) and Permits to Fly (issued under Part 21 or British Civil Airworthiness Requirements). These processes are described at a high level in recently published short guides for innovators who intend to start the certification of their aircraft and want to conduct experimental flights of innovative aircraft. Regarding RPAS, the CAA has the power to issue permissions and exemptions to allow certain operations. New and novel aircraft can benefit from utilising temporary danger areas (TDA) to provide segregated volumes of airspace for test and trials, as well as for temporary operations.
26. As the CAA moves towards operationalising new and novel aircraft, there are well-understood pathways that can be followed. For piloted aviation, airworthiness certification, type certificate and type approval, among others. For RPAS, there are three categories: open, specific and certified (the last one is currently being developed).
27. The challenge is how to scale operations. The CAA is currently considering what the future role of airspace and supporting technologies for airspace integration can be. This task is being delivered through the refresh of the Airspace Modernisation Strategy (AMS). We are streaming the learning from a variety of sources, including the UK Research and Innovation-funded Future Flight Challenge (FFC), Connected Places Catapult (CPC)'s Pathfinder Programme and the CAA's own Innovation Hub sandboxes into the AMS refresh process. All of these activities provide us with significant intelligence with which to evaluate the future needs of regulation.