



UK Research
and Innovation

Future Flight Challenge

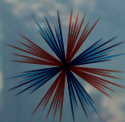
Socio-economic study – summary
January 2021



In association with



pwc



**INDUSTRIAL
STRATEGY**

Introduction

PwC was asked to develop and test a holistic framework for assessing the potential costs and benefits of certain use cases selected by the Future Flight Challenge.

Background

Considerable opportunity exists for developments in aviation technologies to boost the UK economy and deliver wider societal benefits.

The Future Flight Challenge (FFC), a £300 million programme which is part of the Industrial Strategy Challenge Fund (ISCF), aims to stimulate the development and application of new aviation technologies in the UK. The FFC supports new technologies ranging from freight-carrying drones to urban air vehicles to hybrid-electric regional aircraft. It seeks to help position the UK as a global leader in aviation technology.

To support the widespread and safe use of new aviation technologies, the FFC wants to understand the potential costs and benefits (intended and unintended, direct and indirect) of different use cases and their key drivers.

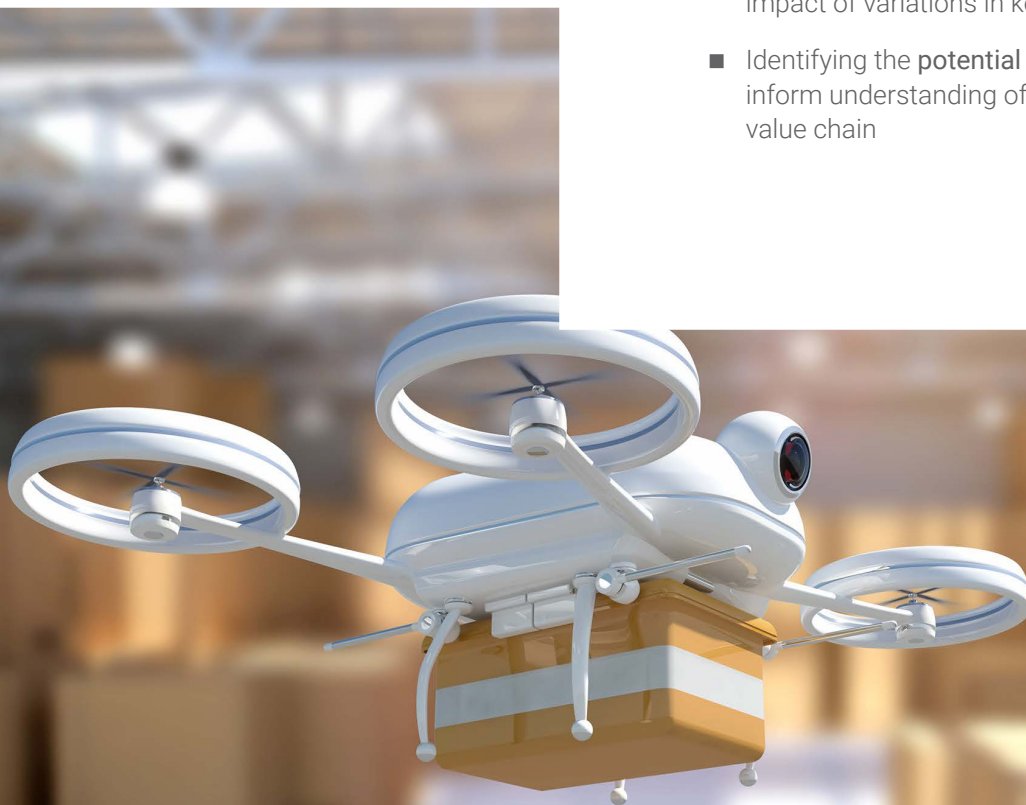
Purpose of this study

UK Research and Innovation commissioned PwC UK to undertake a study to develop a holistic framework that can be used to assess the potential costs and benefits of certain use cases selected by the FFC.

The framework has been tested on six different use cases which represent potentially valuable applications of new aviation technologies.

As such, the study supports the FFC by:

- Developing a **holistic framework of potential costs and benefits** capturing the full range of impacts relevant to each use case
- Identifying the **key drivers of different costs and benefits** and the valuation coefficients to measure their scale
- Assessing the **indicative scale of potential costs and benefits** across the given use cases
- Performing **sensitivity analysis** to understand the impact of variations in key cost/benefit drivers
- Identifying the **potential stakeholders impacted** to inform understanding of the incentives across the value chain



Summary

The scope and purpose of analysis

This study has developed and tested a holistic framework that can be used to assess the potential costs and benefits of different applications of future flight technologies compared to how the use cases are currently fulfilled which we refer to as “business as usual”.

Our report analyses the six different use cases shown in the table below.

These use cases were selected to provide illustrative applications of drones or advanced air mobility technologies for applications which are already well defined; they are not intended to be representative of all possible applications.

Use case	Use case description	Sector	Location
Powerline inspection	Inspection of the Beauly-Denny powerline	Utilities	Beauly-Denny, Scotland
Cargo delivery – mail	Movement of mail from Inverness to Kirkwall	Transport & Logistics	Inverness-Kirkwall, Scotland
Last mile delivery – prescribed medicines	Delivery of prescribed medicine to patient homes	Medical	Urban area
Sub-regional air taxi	Passenger journey from York to Preston	Transport & Logistics	York to Preston
Rural air taxi	Passenger journey between village and village or village and town	Transport & Logistics	Rural area
Urban air taxi	Passenger journey within an urban area	Transport & Logistics	Major city – modelled on London

We develop a bottom up model to estimate the total costs for each use case and for business as usual. We rely upon data in published sources, academic literature, government guidance and PwC proprietary analysis to support our model.

We establish a set of base case costs for each use case - often underpinned by some key assumptions - and identify the key cost drivers. We then conduct a sensitivity analysis, where we flex various cost drivers to explore their impact on the overall net costs.

Summary

Key findings and interpretation of findings

Key findings

Our analysis suggests that in the majority of use cases there are significant potential benefits associated with the use of drone and advanced air mobility technologies. The overall unit cost of the use cases is between 20-48% lower than business as usual. The table below sets out the cost under the business as usual and the use case and shows the difference between them.

The two use cases where the cost of the use case is greater than business as usual are Rural and Urban air taxis. This is primarily driven by the higher “fare” element of the costs which, in turn, reflects the (assumed) single occupancy. Both use cases present time saving benefits and, therefore, have lower time related costs relative to business as usual.

Use case	Unit cost of business as usual	Unit cost of use case	Difference in unit cost
Powerline inspection	£193,141	£127,856	-34%
Cargo delivery – mail	£1,722	£1,117	-35%
Last mile delivery	£15	£12	-20%
Sub-regional air taxi	£126	£66	-48%
Rural air taxi	£24	£40	67%
Urban air taxi	£31	£38	23%

Interpretation of findings

Our analysis shows the potential offered by drone and advanced air mobility technologies across the sample of use cases.

In our sensitivity analysis, we flex various cost drivers to explore their impact on the overall net costs. We find that, for the majority of sensitivities, the use cases continue to have lower costs than the business as usual.

We note that our analysis is based on the initial uptake of the drone or air mobility technology and, therefore, captures the net costs at a particular point in time; our analysis does not consider how the costs and benefits could change as the technology becomes more pervasive.

The findings of our analysis highlight the potential market opportunity that could be realised through the applications of the drones and advanced air mobility technologies we have considered; further analysis is required to understand the scale of the opportunity.

In addition, our study does not consider the extent of societal acceptance of these technologies, the regulatory implications, nor the supporting infrastructure and technology ecosystem required for the use cases, which may have implications on their attractiveness.

Future analysis could consider these factors and how the external costs and benefits associated with each use case could change if take up of the technologies becomes significant. We could also investigate how similar the picture is for other potential use cases, beyond those considered in this study.

FFC: **Kerissa Khan**, Innovation Lead, ISCF Future Flight Challenge, UK Research and Innovation
07395 376965
kerissa.khan@innovateuk.ukri.org

PwC: **Craig Roberts**, PwC Drones Technical Lead
07771 930482
craig.roberts@pwc.com



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