Greener Skies Ahead? What Role Can Hybrid Aircraft Play in ‘Future Flight’?

CTS Symposium, UWE Bristol, 02/07/2025

Loughborough University

UWE Bristol University of the West of England

UKRI Future Flight Challenge to 2030

Connecting People, Delivering Goods, Providing Services

https://www.ukri.org/what-we-do/browse-our-areas-of-investment-and-support/future-flight/

Drones

Advanced Air Mobility

Regional Air Mobility (e, H_2, hybrid power)

Current UK Transition to Greener Aviation

- Aviation performs special roles in the global transport system
- International shipping and aviation 2% of cumulative global total 1850-2019 emissions (International Panel on Climate Change, 2023)
- UK (House of Commons Environmental Audit Committee, 2023)
  - 0.8% per annum efficiency improvements 1990-2019
  - aviation rose to 8% of national emissions by 2023
- Heathrow expansion again under debate!

2035 seems to be an important date for sustainable aviation in the UK

- Heathrow Runway 3 might open
- Airbus (2025) “ambition” to deliver first H_2FC commercial aircraft
- UK DfT (2024) 15% of turbine fuel to be Sustainable Aviation Fuel
  - 80% lower CO_2 emissions so worth 12% saving

In 2035, 15 years left to achieve ‘jet zero’…on a wing and a prayer?

spumonihFor Unsplash+

CoFFEE: Co-creation of Future Flight Ecosystems and Enterprise

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Research Questions

WP1	How do the motivations of aerospace industry technologists, businesses, and social entrepreneurs influence the emergent FF business models?
WP2	Can socially and environmentally sustainable FF scenarios exist and, if so, how can they be co-created by engaging with technologists, businesses, and communities?
WP3	How can the emerging FF ecosystem be nudged and steered to focus on business models which are both viable for business and meet pressing sustainability objectives?

Airlander: one of three niches

Two were able to proceed to primary data collection

Third based on documentary analysis

- Drone integration in Human Milk Foundation supply chain

- Airlander Hybrid Air Vehicle and Doncaster Green Aerospace Hub

- Sora Aviation 30-seat eVTOL ‘skybus’

Airships were once ‘the future’!

64 X

Luftschiffbau Zeppelin LZ No. 2 Friedrichshafen, Germany

To South America by Zeppelin

1934 Time Table of the airship „Graf Zeppelin“.

Friedrichs-hafen *	Pernam-buco	Rio de Janeiro	Aeroplane connection of Syndicato Condor Ltda.		Rio de Janeiro	Pernam-buco	Friedrichs-hafen *
Dep. Saturday evening	Arr. Tuesday evening	Arr. Thursday morning	Buenos Aires Arr. Friday	Buenos Aires D. Wednesd.	Dep. Thursday morning	Dep. Friday evening	Arr. Tuesday after noon
6. 9.	6. 12.	6. 14.	6. 15.	6. 13.	6. 14.	6. 15.	6. 19.
6. 23.	6. 26.	6. 28.	6. 30.	6. 30.	7. 1.	7. 2.	7. 6.
7. 21.	7. 24.	7. 26.	7. 27.	7. 25.	7. 26.	7 27.	7. 31.
8. 4.	8. 7.	8. 9.	8. 10.	8. 8.	8. 9.	8. 10.	8. 14.
8. 18.	8. 21.	8. 23.	8. 24.	8. 22.	8. 23.	8. 24.	8. 28.
9. 1.	9. 4.	9. 6.	9. 7.	9. 5.	9. 6.	9. 7.	9. 11.
9. 15.	9. 18.	9. 20.	9. 21.	9. 19.	9. 20.	9. 21.	9. 25.
9. 29.	10. 2.	10. 4.	10. 5.	10. 3.	10. 4.	10. 5.	10. 9.
10. 13.	10. 16.	10. 18.	10. 19.	10. 17.	10. 18.	10. 19.	10. 23.
10. 27.	10. 30.	11. 1.	11. 2.	10. 31.	11. 1.	11. 2.	11. 6.

* In Europe there are direct aeroplane connections operated by the Deutsche Lufthansa A.-G.

The foregoing Time Table is subject to alteration, especially as regards the departure dates in and after August.

Fares:

Friedrichshafen—Pernambuco ..... RM 1400.—
Friedrichshafen—Rio de Janeiro ..... RM 1500.—
Pernambuco—Rio de Janeiro ..... RM 400.—
Rio—Buenos Aires (Aeroplane) ..... RM 400.—

Freight rates (excluding Consular fees):

Friedrichshafen—Pernambuco .. RM 8.— per kilogramme
Friedrichshafen—Rio de Janeiro RM 10.— per kilogramme

For Information and Bookings please apply to:

Hamburg-American Line,
Wm. H. Müller & Co., 66-68 Haymarket, London SW 1
their agencies, travel bureaus, or:

HAPAG

Airlander Hybrid Aircraft

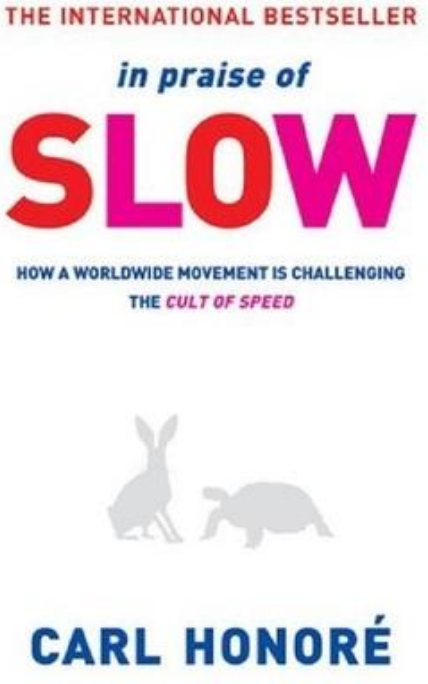
https://youtu.be/EwhWUkfngWg?si=qQK7RwT7KmGCUVm4

- Airlander 10: 100 pax or 10t freight
- 92m helium-filled envelope 60% lift; 40% aerodynamics
- CO_2 75% lower (kerosene)
  - Fuel cell zero-GHG flight by 2030
- lower flight altitude
  - contrail production avoided
  - cabin pressurisation not necessary
- minimal ground infrastructure
  - broad range of destinations served directly
  - minimising investment needs
  - Lower environmental impacts than traditional airports

Credit: Hybrid Aircraft Ltd

But cruising speed is around 70 knots (130kmh / 80 mph)

How far could slowing down air travel be acceptable?



- Transatlantic trip?
  - two days rather than 7-8 hours
- Short-haul flight?
  - In-aircraft time relatively low
  - Point-to-point travel offsets speed disadvantage
- Air cruise?
  - slow speed an advantage
  - passengers enjoy view through large windows
  - space at less of a premium than onboard jet

Credit: Hybrid Aircraft Ltd

Survey of public perceptions of Airlander in South Yorkshire

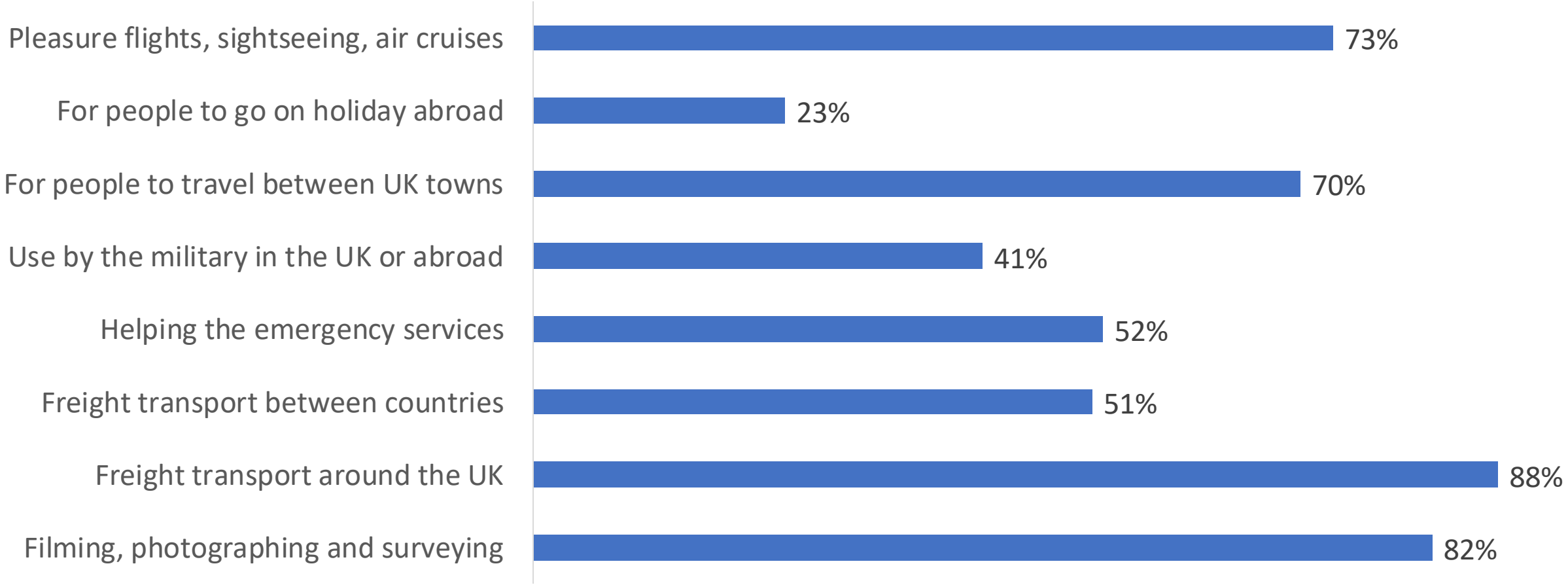
Online, n=277
96% DN, 4% S postcode areas
Two-third male
40% in work
20% frequent flyers

1. awareness of Airlander
2. views on hosting the production facility
3. perceptions of Airlander as a future transport option

Awareness and Broad Sentiment

- **Awareness:**
  - 75% of respondents had heard of Airlander, primarily through digital media
  - 85% expressed positive feelings about the project (optimism, excitement, relaxation)
  - recognised for its sustainability and novel design, some links to historic airships
- **Economic and Local Impacts:**
  - Over 90% believe the production facility will generate “good jobs”
  - optimism about Doncaster's role in sustainable aviation
  - Moderate concerns about road traffic and wildlife impacts

Which of the following can you imagine Airlander might be used for?



Join at menti.com | Use vote code 5901 0154

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You are thinking about making a 1 hr journey on a jet plane. How much longer would you be willing to spend travelling to "help the environment"?

Responses are hidden

Waiting for participants

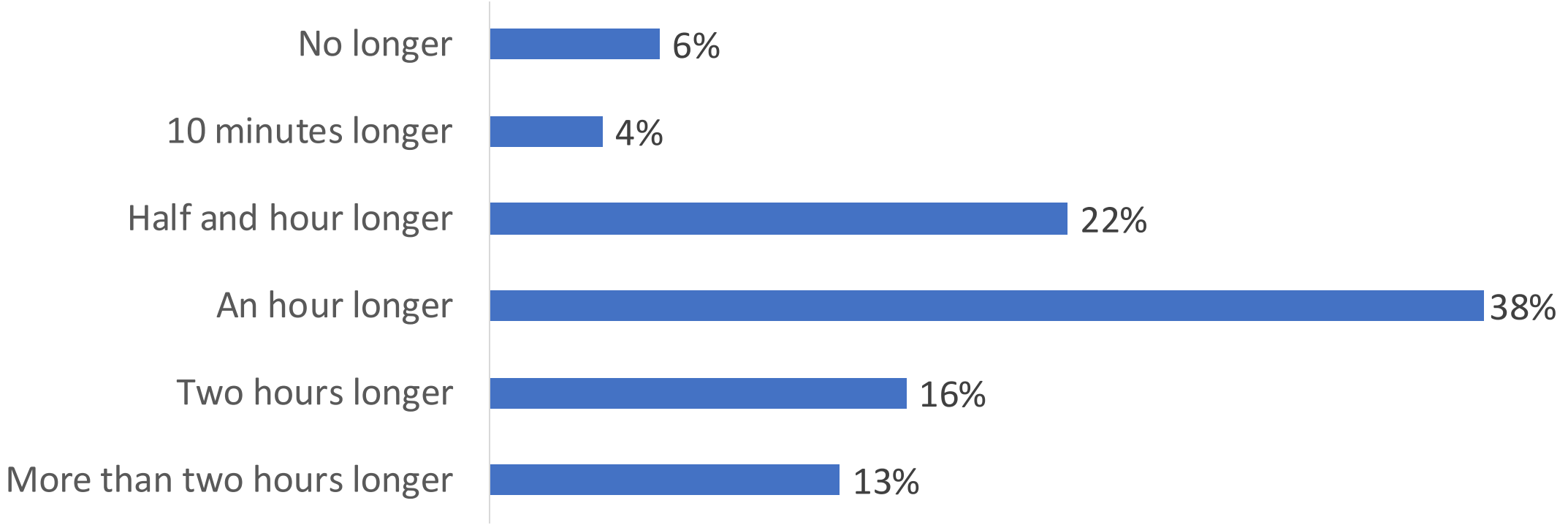
No longer | 10 mins | 30 mins | 1 hour | 2 hours | Over 2 hours

Menti

UTSG2025FF

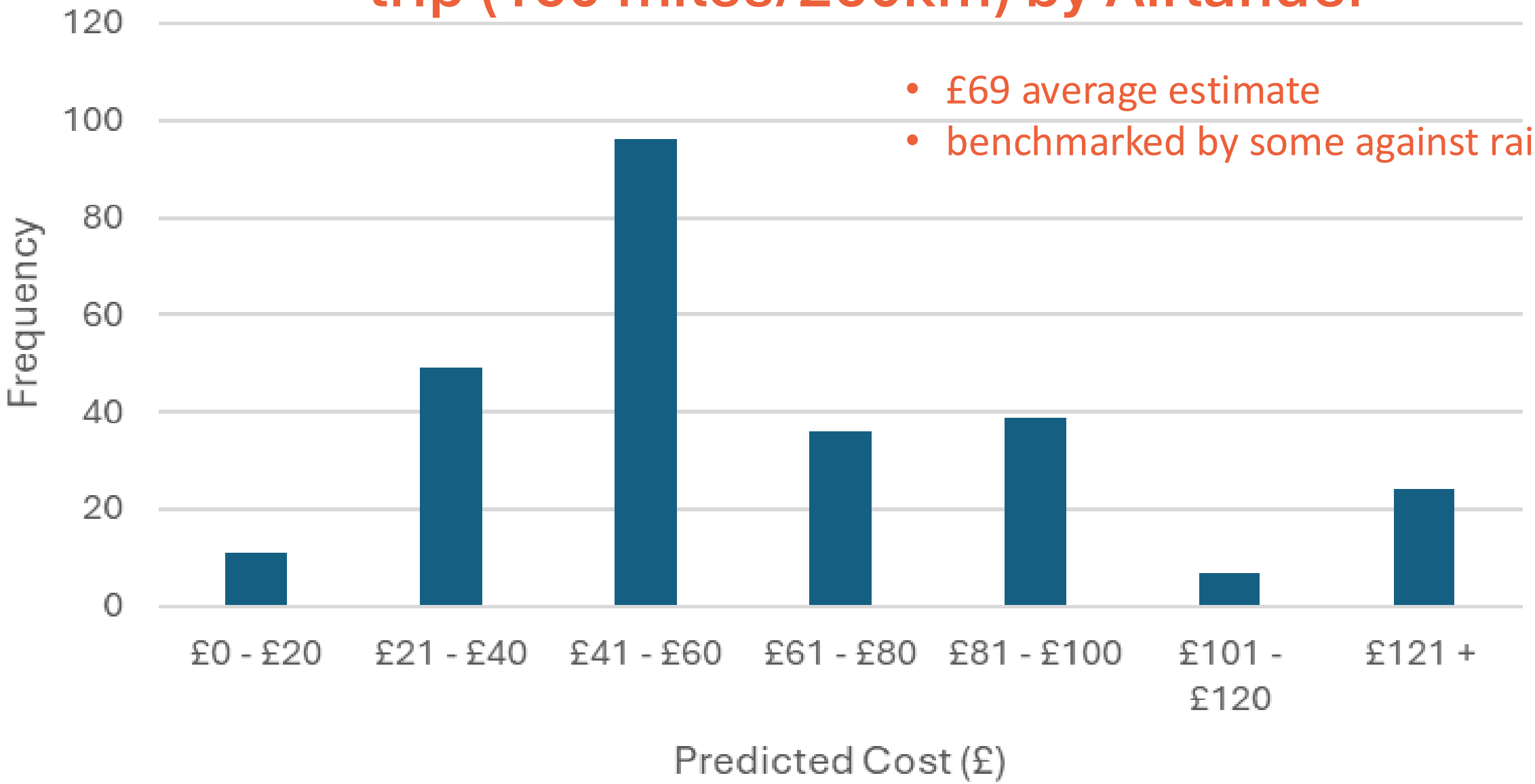
Choose a slide to present

Imagine you are thinking about making a journey that takes one hour on a jet plane. How much longer would you be willing to spend travelling to help the environment?



Cost and Environmental Impact rated highest of 8 journey attributes

Predictions of cost of a Doncaster-London one-way trip (160 miles/260km) by Airlander



- £69 average estimate
- benchmarked by some against rail

The Way Forward: Refine easy-to-serve niches

Evidence of strong personal concerns about the environmental impacts of aviation and willingness to make compromises to be able to fly with lower impacts, at least for short-haul flights

- Caveats
  - hypothetical trip, explicitly considering only journey time and environmental impact
  - positive associations with hosting factory
- Potential niches…
  - Journeys with low proportion of in-aircraft time
  - Replacing water services
  - Complementing long-distance rail network
    - UK HS2 integration north of Birmingham?
  - sleeper services, so travel time is used ‘productively’

Credit: Hybrid Aircraft Ltd