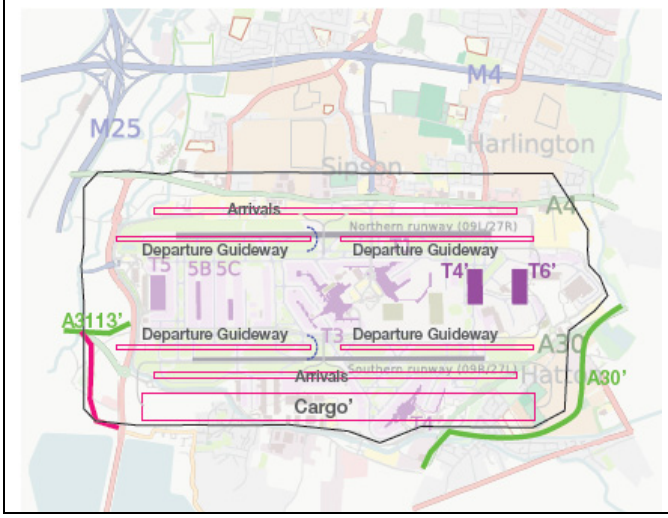
| PROPOSAL TITLE: | Exhaustless | Short Term | ☐ |
|---|---|---|---|
| SUBMITTED BY: | Exhaustless, Inc. | Medium/Long Term | ☒ |

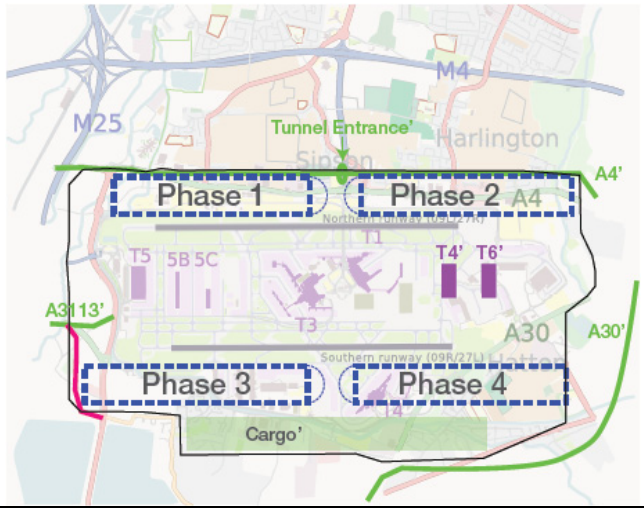
## PROPOSAL

The proposal is a request for research and development funding towards a scale proof of concept for an innovative assisted take off system. An electromagnetic propulsion system would launch unmodified aircraft at high speeds, which it is claimed could enable more aircraft departures per hour, reduce aircraft fuel consumption, and free up existing runway capacity for arrivals.

If the technology could be proven, a four-phase programme of installing the systems at Heathrow is proposed, beginning with a first phase north-west of the existing airport campus.

Phase 2 (north-east of the existing airport campus) would be completed by 2024, intended to meet medium term demand.




## INITIAL ASSESSMENT COMMENT

The promoters claim the proposal could have the potential to transform the aviation industry both through increased airport capacity and reduction in fuel consumption, carbon emissions and noise.

The scheme is a high-risk and unproven concept for which £200m in research and development funding is sought. As such, it appears to fall outside the Commission's remit.

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OVERVIEW

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|---|---|---|
| **Proposal** | **Proposal to install an innovative system using energy from the grid to assist aircraft take-offs using electromagnetic propulsion along dedicated guideways.** | |
| **Approach** | **Request for £200m research and development funding for 24-month scale model proof of concept and full scale tests of specific components.**<br>**Four-phased approach at Heathrow Airport with phases 1 and 2 completed by 2020 and 2024 respectively.**<br>Each phase would involve the installation of a guideway with which unmodified aircraft can be assisted in taking off. Existing runways would be used for landings and take-offs for unapproved aircraft types or carriers wishing to use a conventional take-off. | **Stated Capital Cost**<br>1st Guideway: **£7.5bn**<br>2nd Guideway: £8.5bn<br>3rd & 4th Guideways: n/a |
| **Potential Benefits** | ▪ Shorter distance and time required for take-offs, enabling increased departure capacity; existing runway capacity would be freed for arriving aircraft.<br>▪ Reduced aircraft fuel consumption during take-off and climb.<br>▪ Reduction in aircraft noise during take-off.<br>▪ Steeper climb, reducing departure noise contour.<br>▪ Higher take-off speed; take-off direction less dependent upon wind direction.<br>▪ Extended hours of operation, given reduced take-off noise.<br>▪ Claimed increased aircraft range since fuel payload consumption is lower during take-off. | **Capacity (mppa)**<br>n/a<br>**Capacity (ATM)**<br>1st Guideway: **1.3x current level**<br>2nd Guideway: **2.1x current level** |
| **Key Issues & Risks** | | |
| Strategic Fit | ▪ Fundamentally the proposal is not aligned with the Commission's remit as it is a request for research and development funding for a concept unproven to date. | |
| Economy | ▪ Economic benefits cited include: providing the airport capacity to meet growth in demand, leading to a **£1.5bn increase in annual trade and 32,000 jobs**; a cascade of benefits through reduced noise, pollution and carbon emission; and the substitution of foreign sourced jet fuel with UK generated grid electricity. | |
| Surface Transport | ▪ On the basis of an assumed use at Heathrow Airport, other than the diversion of certain local roads to accommodate guideways, no changes in surface transport are envisaged by the promoters for the first two phases, despite the significant increase in capacity claimed. | |
| Environment | ▪ According to the proposal, **noise from aircraft departures would be expected to reduce Leq contours by 6dB due to faster acceleration decreasing exposure time. Lower throttle settings would further reduce noise by 8db-10bd.**<br>▪ Shorter take-off distances, higher acceleration increasing Doppler shift, and increased take-off velocity, further contribute to noise reduction.<br>▪ Air quality would, according to the proposal, improve as a result of a significant reduction in fuel consumption during taxiing and take-off. | |
| People | ▪ The proposal highlights positive social impacts through reduced aircraft noise and improved air quality, and the creation of employment as the airport expands.<br>▪ The negative impacts associated with increased surface transport congestion due to increased airport capacity are not discussed. | |
| Cost | ▪ Initial research and development costs are budgeted at £200m for a 24 month period.<br>▪ Four guideways would be required to meet forecast demand to 2050, each system estimated at £4bn with additional costs of preparing the site (land purchase, building demolition and relocation etc.) at around £3.5-4bn). | |
| Operations | ▪ The impact of this concept of operations on airspace capacity, air traffic management, climb profiles, and apron capacity has not been evaluated at this stage. The claimed benefit that wind direction need have less effect on take-off direction may not carry much weight since aircraft approach direction continues to be heavily influenced by wind direction. | |
| Delivery | ▪ Following proof of concept, Government loan guarantees may be required for infrastructure financing until the technology has a proven track record.<br>▪ The proposal assumes that revenues from the take-off service (**fees estimated at £14 per pax**) would provide sufficient working capital for operations.<br>▪ The timeline of the scheme indicates 2.5 years for proof of concept, 2 years for planning processes, and 2 years for construction, giving an in service date of 2020. This appears extremely ambitious for the introduction of a currently untested technology at one of the world's most heavily used airports. It also assumes that the R&D period commences before the Commission's final report. | |