Grant Thornton

Future Regulatory Approach – Cost Assessment

Final Report for the Civil Aviation Authority

10 July 2024

Grant Thornton

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10th July 2024

We have pleasure in enclosing a copy of our Final Report in accordance with your instructions dated 25.03.2024. This document (the Final Report) has been prepared by Grant Thornton UK LLP (Grant Thornton) for the Civil Aviation Authority (the Addressee) in connection with the contract titled Future Regulatory Approach – Cost Assessment (the Purpose).

The Final Report has been prepared for the Civil Aviation Authority, and we accept no duty of care nor assume any responsibility to any person other than you. We agree that you can share the final Report, but not this Final Report, with others in relation to the Purpose. The Supplier accepts no duty of care nor assumes any responsibility to any person other than the Buyer. Any third party who chooses to rely upon the Supplier's work shall do so entirely at their own risk.

To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Addressee for our work, our Report and other communications, or for any opinions we have formed. We do not accept any responsibility for any loss or damages arising out of the use of the Report by the Addressee(s) for any purpose other than in relation to the Purpose.

The data used in the provision of our services to you and incorporated into the Report has been provided by third parties. We will not verify the accuracy or completeness of any such data. There may therefore be errors in such data which could impact on the content of the Report. No warranty or representation as to the accuracy or completeness of any such data or of the content of the Report relating to such data is given nor can any responsibility be accepted for any loss arising therefrom.

Period of our fieldwork

Our fieldwork was performed in the period between 25.03.24 and 30.05.24. We have not performed any fieldwork since 30.05.24 and, in agreement with the addressees of this Report, our Report may not take into account matters that have arisen since then. If you have any concerns in this regard, please do not hesitate to let us know.

Scope of work and limitations

Our work focused on the areas set out in our engagement letter. The scope of our work has been limited both in terms of the areas of the business and operations which we have assessed and the extent to which we have assessed them. There may be matters, other than those noted in the Final Report , which might be relevant in the context of the Purpose and which a wider scope assessment might uncover.

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Scope of work and limitations

Our work focused on the areas set out in our scope of work that we agreed to. Full detail on our scope and approach is contained in our proposal. There may be matters, other than those noted in the Final Report, which might be relevant in the context of the Purpose and which a wider scope assessment might uncover.

Forms of report

For your convenience, the Final Report may have been made available to you in electronic as well as hard copy format, multiple copies and versions of the Final Report may therefore exist in different media and in the case of any discrepancy the final signed hard copy should be regarded as definitive.

General

The Final Report is issued on the understanding that the management of the Civil Aviation Authority have drawn our attention to all matters, financial or otherwise, of which they are aware which may have an impact on our Final Report up to the date of signature of this Final Report. Events and circumstances occurring after the date of our Report will, in due course, render our Final Report out of date and, accordingly, we will not accept a duty of care nor assume a responsibility for decisions and actions which are based upon such an out of date Final Report. Additionally, we have no responsibility to update this Final Report for events and circumstances occurring after this date.

Notwithstanding the scope of this engagement, responsibility for management decisions will remain solely with the directors of the Company and not Grant Thornton. You should perform a credible independent review of any analysis provided.

Contacts

If there are any matters upon which you require clarification or further information, please contact Schellion Horn at Schellion.J.Horn@uk.gt.com (+44 2078652288) or Joel T strange at joel.t.strange@uk.gt.com (+442077283423)

Yours faithfully

Schellion Horn (Partner) and Joel T Strange (Director)

Contents

Contents (continued)

Appendices

Glossary of terms

CAA	Civil Aviation Authority
FD	Final Decision
RP3	The price control period that was set and applied to NERL during the years 2020 to 2022.
H7	The price control and associated regulatory framework that applies to Heathrow Airport Limited for the five-year period starting in January 2022 and ending in December 2026
NR23	The five-year price control for the period 2023 to 2027 that applies to NATS (En Route) plc
H8	The next price control after H7
NR28	The next price control after NR23
HAL	Heathrow Airport Limited
NATS	NATS
NERL	NATS En-Route PLC
DfT	Department for Transport
opex	Operating expenditure
capex	Capital expenditure
OBR	Office for Budget Responsibility
CPI	Consumer Price Inflation
CMA	Competition and Markets Authority
Real Price Effect	The real changes in input prices relative to consumer price inflation
Ofwat	Water Services Regulation Authority
Ofgem	Office of Gas and Electricity Markets

ANSPs	Air Navigation Service Providers
GAD	Government Actuary's Department
ORR	Office of Rail and Road
PR23	ORR's periodic review for 2024 - 2029
Ofcom	Office of Communications
RIIO	The price control framework used by Ofgem for regulating the companies that operate the gas and electricity grids. Stands for Revenue = Incentive + Innovation + Outputs.
ABG	Airport Benchmarking Group
DEA	Data Envelopment Analysis
OLS	Ordinary Least Squares
COLS	Corrected Ordinary Least Squares
MOLS	Modified Ordinary Least Squares
SFA	Stochastic Frontier Analysis

01
Executive summary

Executive Summary

Background

- Heathrow Airport Limited (HAL) and NATS (En Route) plc (NERL) are subject to economic regulation by the Civil Aviation Authority (CAA) through periodic reviews
- This study is motivated by a Department for Transport (DfT) commissioned review of the CAA and a subsequent lessons learned consultation currently being undertaken by the CAA (CAP 2618)
- The CAA has commissioned Grant Thornton, in collaboration with the Institute for Transport Studies at the University of Leeds and Clarity Economic Consulting, to conduct an independent and forward-looking review of its current cost assessment approach and explore opportunities to strengthen it

Scope of work and methodology

- The focus of this review has been to identify practical approaches through which the CAA could enhance its methodology i.e. developing estimates of efficient costs that are more robust, including expanding the use of external benchmarks
- This review has followed a detailed and structured methodology to draw out the key findings of the assessed options. The following steps were taken:
  - A summary of the current cost assessment approach used by the CAA in H7 and NR23, set out in Section 3
  - This review was undertaken in the following parts (see Section 4):
    a) The process taken to identify the set of options to be assessed
    b) The framework applied to these options to determine the shortlist, including evidence for why options were deemed suitable
    c) The considerations made in the roadmap applied to the shortlist

Overall conclusions and key findings

- The findings of this review focus on identifying the pros, cons, risks, and challenges the CAA can expect with a range of complementary options. A summary of the key findings is provided in Section 5, with further information on longlist framework and shortlist roadmap available in Appendix B and Appendix C, respectively
- It is clear from this review that all options discussed offer benefits, particularly in enhancing transparency and increasing the confidence the CAA and stakeholders have in the allowed revenues determined. Nonetheless, the following key findings have been noted, with the main body of the report discussing these in more detail:
  - There is scope to complement and strengthen the CAA's current cost assessment approach, particularly by making use of external benchmarks to contribute to identifying the 'efficiency frontier'
  - There is no single option the CAA should adopt to the exclusion of others, but nor is pursuing too many options likely to be appropriate. Prioritisation will likely be necessary to make the most of the limited resources the CAA has, with the recommended priority options being:
    a) International benchmarking
    b) Targeted bottom-up analysis
    c) Gap analysis and triangulation
  - Whilst the findings point to a set of priority activities, some will require more time to evolve e.g. international benchmarking given the significant resources required and the technical decisions that need to be made e.g. appropriate model, dataset, sample to be used, etc.
- The next pages sets out the key findings relating to the options above

Executive Summary (continued)

Key findings in relation to the priority options recommended

- This review also provides a range of specific findings related to the options that have been identified as priorities for the CAA
- The table below provides a summary of the supporting evidence for each option, emphasising the cost areas where each option would be most effective and the challenges and limitations that have been identfied

Recommended priority options for the CAA to consider to complement its current cost assessment approach

Option	Area of costs it is likely to be applicable	Strengths	Challenges/limitations
International benchmarking	Opex	• The long-term benefits of international benchmarking could be transformative, enhancing the CAA's capacity to establish external benchmarks and ascertain efficient cost levels for HAL and NERL • This approach appears feasible for both entities, leveraging existing datasets such as HAL's international benchmarking study and the ACE benchmarking report. Additionally, the Eurocontrol dataset of European ANSPs offers a robust starting point for NERL • While international benchmarking has the potential for significant incremental impacts, a phased integration strategy is recommended for the CAA (discussed further in this review)	• International benchmarking jurisdiction. Most comparators are outside of the CAA's jurisdiction, unlike other domestic sectors such as water and energy. As a result, there are likely to be differences in comparators that need to be accounted for e.g. scope of businesses, accounting/operational data, etc. • Selection of Comparators. The CAA is required to make a conscious effort to select an appropriate sample of comparators • Resource demands. There are significant human and financial resources required to push option forward • Inherent differences in assets. There will be inherent differences in the assets of the airports and ANSPs selected for international benchmarking purposes, that need to be accounted for
Targeted bottom-up analysis	Opex, Capex and commercial/non-regulated revenue	• This approach enables the CAA to conduct targeted assessments of specific cost areas, offering enhanced assurance to industry stakeholders regarding the set cost allowances • The option carries low risk, as both the CAA and industry share efforts in investigation and implementation • It strengthens the evidence base for the current approach, integrating effectively with the existing regime	• Proportionate level of resourcing. Given the CAA and industry's finite resources, it's essential to focus efforts rather than pursue a comprehensive deep-dive across all areas. • Low risk, low reward. While this option is less risky, it may yield only modest efficiency savings and conclusions about the level of cost allowances set.
Gap analysis and triangulation	Opex, Capex and commercial/non-regulated revenue	• Increases confidence and precision in the conclusions of cost assessment exercises (clear evidence for source of efficiency, not just gaps) • Reduces the risk of error (relative to using a single approach) • Enhances the overall transparency of the CAA's cost assessment approach • Uncovers information about the sources of efficiency (not just the size of the gap)	• Experienced FTEs required. While this approach allows the CAA to benefit from drawing inferences from a range of options, it requires experienced FTE resources that have experience implementing various cost assessment techniques • Expert judgment. While triangulating between approaches is beneficial, it requires expert judgment to accept or reject conclusions from each approach

Source: Grant Thornton UK LLP

02
Background, introduction and scope

This independent review has been commissioned following recommendation 5.6 of the Department for Transport's (DfT's) commissioned review and the CAA's future price controls consultation

Background

- Heathrow Airport Limited (HAL) and NATS (En Route) plc, known as NERL, are subject to economic regulation by the Civil Aviation Authority (CAA) through periodic reviews, known as 'price controls'. This regulatory oversight is mandated by the Civil Aviation Act 2012 for HAL and the Transport Act 2000 for NERL
- Through these price controls, the CAA determines the revenue necessary for HAL and NERL to operate efficiently, encompassing operating expenditure (opex), capital expenditure (capex), and returns - commonly referred to as the 'building blocks' of the price control framework
- The primary objective is to ensure that HAL and NERL provide prices and service quality comparable to those in a competitive market, thereby maximising economic welfare. Simultaneously, HAL and NERL should generate sufficient profits to efficiently raise capital for their operations without excessive returns
- This review focuses specifically on cost assessment, which involves how the CAA evaluates HAL and NERL's costs to establish efficient levels of opex, capex, and non-regulated/commercial revenue
- Of particular interest in this review are complementary approaches that can provide insights into HAL and NERL's cost efficiency, above and beyond CAA's existing approach to cost assessment. For instance, this may include benchmarking HAL and NERL against a viable comparator set, aiming to establish an 'efficiency frontier' and assess how closely HAL and NERL align with it

Term of reference and context

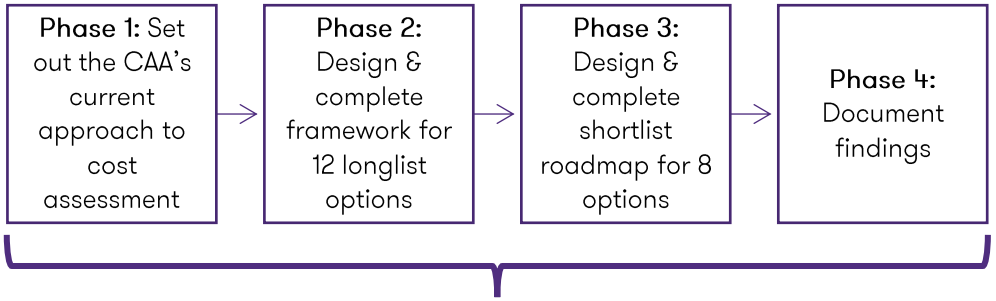
- The CAA appointed Grant Thornton, in collaboration with the Institute for Transport Studies at the University of Leeds and Clarity Economic Consulting to assist with identifying possible complementary future approaches to cost assessment for HAL and NERL as part of H8 and NR28 respectively
- This review forms part of a broader consultation the CAA is undertaking on setting future price controls for HAL and NERL (Setting future price controls – review of approach, CAP2618) [1], which follows the recommendation of the Department for Transport's (DfT's) commissioned review of the CAA as part of the Cabinet Office Public Bodies review programme. Recommendation 5.6 of the review states "*The process for conducting economic regulation should be reviewed when the current Heathrow review (H7) is concluded.... However, we recommend that the review should include 'lessons learned' from all the CAA's economic regulatory activity, and not just H7.*" [2]
- In particular, the CAA set out the following requirements this review should address:
  - A brief review of our approaches to setting allowances for opex, capex and non-regulatory revenues for H7 and NR23 to facilitate understanding of its approach
  - Identifying ways in which it might strengthen its approach, including making greater use of external benchmarks and other assurances, to ensure that the allowances which it sets are reasonable and efficient
  - The next page outlines the scope, methodology, and structure

A forward-looking approach has been taken, particularly highlighting the possibilities of making comparisons to identifying efficiency gains

Scope, methodology and structure

- As previously outlined, the review has taken a forward-looking approach to assessing options
- The current approach used by the CAA (see pages 10 and 11 for more detail) is based on adjustments to HAL's/NERL's existing expenditure from its business plan, and is assumed to continue to underpin the forward-looking approach
- Unlike other sectors, such as water and energy which have several domestic companies to compare against, aviation lacks natural domestic comparators. This review explores the possibilities and benefits of making comparisons with comparable entities and professionally derived benchmarks, such as unit cost analysis, to identify efficiency opportunities
- The methodology for this review follows four distinct phases which are summarised in the diagram to the right
- To ensure the independent review reflects a full range of perspectives, the CAA, industry stakeholders and our academic experts have been engaged throughout the review. In particular:
  - Industry stakeholders, as part of Phase 2, were sent questions to help inform the longlist assessment
  - 2 workshops were held, at the end of Phase 2 and 3, internally with the CAA, Grant Thornton and experts to test the process and findings of this review
  - 2 stakeholder workshops were also held externally with stakeholders, including HAL, NERL and airlines, to test the emerging findings
  - A follow-up call was conducted with HAL (at its request) to clarify elements of its Phase 2 question response
- The remainder of this document sets out the following:
  - Section 3 summarises the CAA's current approach to cost assessment (Phase 1)
  - Section 4 sets out the methodology and approach taken to identify longlist options and the framework/roadmap that has been applied (Phase 2 and 3)
  - Section 5 provides this review's findings

Overview of the methodology used for the review



Source: Grant Thornton UK LLP

03
CAA's current approach to cost assessment

The CAA's current approach to cost assessment for HAL in H7

Approach in H7

- This slide sets out a high-level description of the approach taken by the CAA in its cost assessment for HAL in H7. A more detailed explanation is set out in Appendix A

Operating expenditure

- The CAA broadly uses a business plan approach to set opex allowances for HAL, starting with a historical 2019 opex figure from HAL's business plan. Adjustments are then made to estimate an efficient baseline:
  1. Efficiency improvements and exogenous changes since the baseline, including cost increases due to the London Living Wage, deductions from efficiency savings, renegotiation of the baggage contract, and other adjustments. This evidence was typically provided by HAL
  2. Adjusting for "volume driver" effects, accounting for changes in key activity volumes. This evidence was broadly based on industry and stakeholder sources, estimated using a detailed elasticity formulas adjusted for each cost type
  3. Adjusting for 'real price effects' and ongoing productivity improvements, estimated by assessing a set of bespoke and publicly available indices
  4. Considering overlays, e.g., Covid-19, enhanced service, resilience, and possible future adjustments for uncertain items. This was broadly based on detailed evidence provided by HAL through engagement

Capital expenditure

- The CAA assessed HAL's efficient capex baseline considering project maturity and data quality through a two-stage process:

Approach in H7 (continued)

  - Step 1: Need assessment. This involves assessing HAL's business plan and excluding projects unlikely to be required for H7
  - Step 2: Efficiency assessment. This involved:
    1. Engaging with HAL to seek further clarification on proposed programmes and spending, using HAL's business plan
    2. Conducting a top-down assessment of costs by programme
    3. Performing a bottom-up assessment to evaluate unit rates across programmes
- The CAA also employs the capex governance framework and an uncertainty envelope mechanism, allowing stakeholders to scrutinise certain programmes and bring forward others deemed important

Commercial revenue

- The CAA uses HAL's business plan to set allowances for commercial revenue. The CAA makes the following adjustments to historical 2019 commercial revenue to estimate an efficient baseline:
  - Long-term projection. The CAA estimates growth in commercial revenue per passenger using evidence provided by HAL
  - Sense checks. A comparison is made between pre-Covid-19 revenues and projections to assess alignment with expectations
  - Broader review. Reassurance is provided by using an overarching approach, benchmarks, and experts' views to challenge HAL's projections and overlays. This includes applying a management stretch on HAL's ability to grow revenue per passenger
- This next page outlines the CAA's approach for NR23

The CAA's current approach to cost assessment for NERL in NR23

Approach in NR23

- This slide outlines a high-level description of the approach taken by the CAA in its cost assessment for HAL in NR23. A more detailed explanation is set out in Appendix A

Operating expenditure

- The CAA and its advisors broadly use a business plan approach when setting opex allowances for NERL, starting with a historical 2022 opex figure from NERL's business plan as the baseline. Opex costs are defined in three categories, with the following considerations:
  1. Staff costs: Unit cost analysis was conducted to determine productivity improvements. The CAA's advisors also performed top-down international benchmarking of Air Navigation Service Providers, although this did not significantly influence the final allowance
  2. Non-staff costs: The CAA took an ad-hoc approach to setting allowances for non-staff costs, drawing inferences from various analyses (top-down, unit cost analysis, efficiency adjustments, etc.) conducted by itself and its advisors. For example, estimated efficiency gains from RP3 capex projects were also included in the projections
  3. Pension costs: The CAA's advisors used benchmarks from comparator pension schemes. For example, for Defined Benefit (DB) contribution and deficit repair costs, comparator DB schemes were assessed. For Defined Contribution (DC) pension costs, domestic and sector companies were compared to NERL
- The CAA did not conduct a detailed assessment for real price effects or ongoing efficiency, determining that aggregate opex moves in line with CPI

Approach in NR23 (continued)

Capital expenditure

- The CAA primarily used a business plan approach when setting capex allowances, making minimal adjustments to NERL's business plan. Major adjustments included:
  - Reductions in contingency and risk allowances
  - Ex-post reviews of key RP3 and NR23 capex programmes
  - Adjustments to NERL's NR23 capex forecast, including provisionally allowing reductions in capitalised staff costs
  - Rejecting attempts to reclassify £15m of staff costs as opex, thereby increasing capex by that amount

Non-regulated revenue

- The CAA primarily uses NERL's business plan when setting non-regulated revenue allowances. It considered the forecasts proposed in NERL's business plan to be broadly reasonable and made updates to the allocations of Determined Costs for London Approach and the Ministry of Defence contracts to reflect changes to Determined Costs compared with NERL's business plan

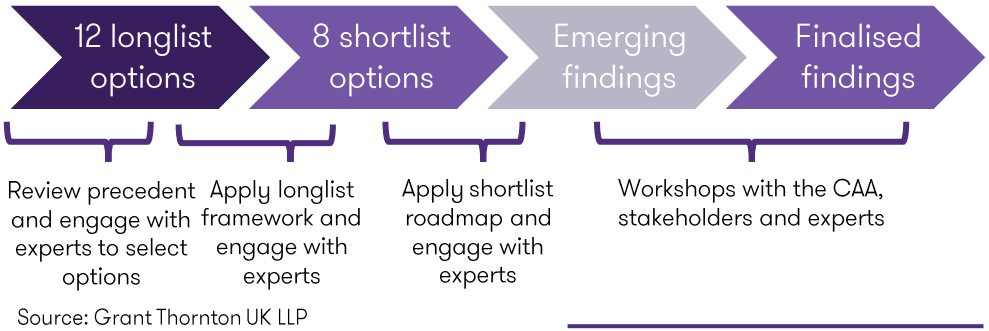
04
Methodology and approach for this review

The review applies a clear and robust framework to assess a broad set of options the CAA could use to strengthen its cost assessment approach

Methodology and approach

- This section sets out the methodology and approach taken for this review. In particular, it details the objectives behind the process and how the framework and roadmap have been used to inform the findings
- Outlining the current approach used by the CAA for cost assessment, for both HAL and NERL, made clear that the CAA's approach focuses on adjusting HAL's/NERL's existing expenditure from the business plan rather than extensive benchmarking with alternatives (whether actual or hypothetical)
- Given the above, the approach used in this review is primarily focused on highlighting additional ways the CAA might strengthen its current approach and how the CAA might best develop/implement complementary approaches and methodologies. This includes making greater use of external benchmarks and other assurances to ensure that the CAA sets not only reasonable levels of allowance for HAL and NERL but ones that reflect an efficient regulated entity
- For phases 2 and 3 of the review, a clear and robust framework has been designed and applied (outlined in the diagram to the right) in collaboration with our academic experts. The defined process has been applied to achieve two key objectives:
  - Firstly, given that the CAA is in the early stages of considering alternative options, the process used to assess the options is presented in a way that the CAA can fully understand the pros and cons, practical considerations, limitations, etc. of each option
  - Secondly, the review has been designed with the objective of providing a meaningful addition to the CAA's evidence base, enabling it to objectively assess all the options that have been set out. This allows the CAA to make informed decisions moving forward if it chooses to proceed with a particular option
- However, the review conducted through the framework and roadmap does not aim to simply eliminate some options while recommending others. Instead, it seeks to identify the strengths, weaknesses, and practicalities of each option
- As part of defining the framework and roadmap for assessing the options, a set of clear definitions is required to ensure that the nuance of each proposed option is clearly set out
- Whilst a particular set of definitions are used for this review, it is possible that a different approach could have been taken to the options selected and how they are defined
- Given the above, this review has selected and defined the options included so that, collectively, they cover a broad range of possibilities. As such, when combined with the approach, they provide a mechanism to reach a set of practical conclusions
- The remainder of this section outlines in more detail:
  - The process taken to identify 12 longlist options, the definitions used, and the framework applied to these options
  - The shortlist roadmap applied, and the considerations made

Process taken from identifying 12 longlist options to the finalised findings



Source: Grant Thornton UK LLP

A range of sources were used to determine a full set of options for assessment, including the CAA's current approach to engaging with experts

Establishing a set of longlist options

- The longlist was developed using the following methods:
  - Review of CAA approaches: the CAA's cost assessment approach in H7 and NR23 (set out on page 10 and 11 and in more detail in Appendix A)
  - Review of precedent in other regulated sectors: which includes CMA determinations/publications around cost assessment from other sectors, including energy, water, and rail
  - Engaging with experts: this includes Professors Andrew Smith and Phill Wheat from the Institute for Transport Studies (University of Leeds) and Professor David Hart from Clarity Economic Consulting
  - Stakeholder response: Stakeholder responses to CAA's setting future price controls – review of approach consultation (CAP2618)
- The table to the right sets out the 12 options in the longlist assessed as part of this review, with options encompassing:
  - Benchmarking techniques, which include different methods that can be used to make quantitative and qualitative conclusions about the costs of HAL and NERL, e.g., unit cost analysis, econometric benchmarking, process benchmarking, etc.
  - Levels of comparison, which involve options that explore the different ways HAL and NERL's cost data can be compared, e.g., international benchmarking, domestic/sector benchmarking, etc.
  - Other types of techniques e.g. market testing and contestability, alternative considerations for 'frontier shift' and 'real price effect' etc
- The following page outlines the framework used to assess the 12 longlisted options

12 longlist options identified

Option	Description
Option 1: Unit cost analysis	Involves evaluating costs per unit of output or service, either across different companies or internally. In this analysis, the unit serves as a key cost driver for the output being measured.
Option 2: Process benchmarking	Comparing business processes from a regulated entity to other entities to identify best practices and areas for improvement.
Option 3: Hypothetical new entrant bottom-up analysis	Constructing a cost base of a hypothetical efficient company by breaking down the activities required and their associated costs. Usually done by analysing the costs of individual activities or components, based on engineering or quantity survey data.
Option 4: Top-down econometric benchmarking	Using econometric methods to estimate the underlying parameters of cost function models, allowing for a better understanding of the different cost drivers affecting companies and providing insights into their relative efficiency.
Option 5: International benchmarking	Comparing various aspects of operations (e.g. efficiency, unit costs, financial performance, charges) across a selection of comparator international entities.
Option 6: Domestic/sector benchmarking	Comparing various aspects of operations across a selection of comparator domestic entities.
Option 7: 'Within company' benchmarking	Comparing specific metrics, or performance indicators within a regulated entity, typically across different assets (e.g. terminals), divisions, or units. It can also involve benchmarking across repeated projects or historical data.
Option 8: Market testing and contestability	Requiring regulated entities to subject their capital programmes (and potentially other process) to competitive tenders and therefore, providing assurance around efficiency.
Option 9: Alternative considerations for 'frontier shift' and 'real price effect'	This could include options around estimating 'embodied' technical shifts (improvements in the design and quality of new versions of capital and intermediate products, which would not be captured in EU KLEMS (database) Total Factor Productivity data used for frontier shift analysis).
Option 10: Business Plan Assessment	The main basis for CAA's current approach.
Option 11: Gap Analysis and Triangulation	This option does not centre on one method alone. Instead, it involves combining various cost assessment techniques to achieve a balanced view by comprehending the sources of differences using a structured framework.
Option 12: Business Plan Assessment with targeted bottom-up analysis	CAA's current approach, combined with targeted bottom-up analysis to supplement the assessment in areas of concern (where appropriate evidence is presented).

Source: Grant Thornton UK LLP

Step 1: A detailed framework is applied to each option which includes a set of criteria, a RAG rating and an overall viability assessment in the context of HAL & NERL

The results of the framework applied

- To assess the merit of each option and determine if they should be considered in more detail, a framework was established. In this framework, each option is assessed against:
  - A set of criteria that enables the CAA to compare the merit of each option easily and consistently (as outlined in the table opposite)
  - A RAG rating to indicate the option's applicability to opex, capex, and commercial/non-regulated revenue, with the table to the right defining each RAG rating
  - An assessment of each option's applicability to HAL and NERL, detailing the extent to which the options are viable for HAL and NERL and the rationale behind these conclusions
- After evaluating the framework results, an assessment of suitability for shortlisting is conducted, which involves reviewing the results of the three assessment points set out above (see Appendix B for the full assessment)
- As previously mentioned, the framework results are not intended to simply eliminate some options while recommending others. Instead, they aim to identify which options will be investigated in more detail in a comprehensive, balanced, and transparent manner, allowing for an in-depth analysis of a select set of options within the review's time constraints
- An option may not be considered in more detail and, consequently, not shortlisted if:
  1. It scores low in terms of the criteria/viability assessment and/or
  2. The CAA already uses the option to some extent, with greater potential value in exploring an alternative approach in more detail
- The next page lists the shortlisted options and reasons for their selection

Criteria within the framework used to assess each longlist option

Criteria	Description
Data availability	Considers whether the necessary data is available.
Approach used by CAA	Considers whether the CAA is currently using the option.
Regulatory precedent for using the approach	Considers whether other UK regulators have used the option.
Time/resource constraints	Considers the time and resources needed to implement the option effectively.
Transparency	Considers the extent to which the option is clear and accessible to all stakeholders.
Proportionality	Considers the time and resources required for implementing the option compared to the potential returns or benefits it could yield.
Alignment with CAA's statutory objectives (other than costs)	Considers whether the option also meets objectives other than costs, including range, availability, continuity, and quality of airport operation services.
Wider issues	Considers whether there are any other relevant issues that are not covered by the criteria above.
Applicability to opex, capex and commercial/non-regulated revenue	Considers whether the option is appropriate for estimating each of the building block costs.

Source: Grant Thornton UK LLP

RAG rating

The option raises **no concern** regarding the criteria in question The option **is likely to be applicable** to the segment of cost assessment in H8 and NR28	The option **raises some concern** regarding the criteria in question The **option may be applicable** to the segment of cost assessment in H8 and NR28	The option **raises notable concern** regarding the criteria in question. The option **is not applicable** to the segment of cost assessment in H8 and NR28

Source: Grant Thornton UK LLP

Options selected for shortlisting scored relatively higher against the framework criteria and are likely to be viable for cost assessment for HAL and NERL

The results of the framework applied for shortlisted options

- This page provides a summary of the supporting evidence gathered from the longlist framework to determine which options should be considered for shortlisting
- Using the results from the longlist framework set out on the previous page, the following options were shortlisted:
  4. Top-down econometric benchmarking
  5. International benchmarking
  6. Domestic/sector benchmarking
  7. 'Within company' benchmarking
  8. Market testing and contestability
  9. Alternative considerations for 'frontier shift' and 'real price effect'
  11. Gap analysis and triangulation
  12. Business plan assessment supplemented with targeted bottom-up analysis (also referred to as targeted bottom-up analysis)
- The table to the right summarises the evidence used to conclude that these options are suitable for shortlisting
- It is important to note that even among the shortlisted options, shortcomings exist. Therefore, these options should not only be considered in isolation but rather in how they can complement the CAA's existing approach
- As stated on the previous page, a detailed assessment of applying the framework to the longlist can be found in Appendix B
- The next page sets out the roadmap applied to the shortlisted options

Rationale for options selected in the shortlist

Shortlisted options	Key reasons for selection
Option 4. Top-down econometric benchmarking	• Strong regulatory precedent across the UK regulated sectors • Likely applicable for both opex, and for both HAL and NERL • Potential to strengthen the CAA's current toolkit in assessing cost efficiency
Option 5. International benchmarking	• No natural domestic comparator for HAL or NERL • Attempts have been made by the CAA (for NR23) and by the regulated entity (HAL's commissioned international benchmarking study) to apply this method
Option 6. Domestic/sector benchmarking	• Data is more readily available for specific types of analysis e.g pension costs for NR23 • The approach has been partially used by the CAA in the case of NERL for NR23 • Potential to be used for opex, capex, and commercial/non-regulated revenue.
Option 7. 'Within company' benchmarking	• Potential application to opex, capex, and commercial/non-regulated revenue • Less complexity and potential for transparent data, if available.
Option 8. Market testing and contestability	• Option likely to strengthen CAA's toolkit, especially concerning capex • Promotes transparency and requires little 'direct data'
Option 9. Alternative considerations for 'frontier shift' and 'real price effect'	• Strong regulatory precedent across UK regulated sectors • Potential to develop this assessment for NERL cost assessment
Option 11. Gap analysis and triangulation	• Required if complementary options are to be applied for HAL and NERL • Likely to support opex, capex and commercial/non-regulated revenue, improving transparency
Option 12. Business plan assessment supplemented with targeted bottom-up analysis	• Likely to help scrutinise specific areas in HAL and NERL's business plan, improving transparency • Viable for HAL and NERL

Source: Grant Thornton UK LLP

Step 2: For options shortlisted, a roadmap is set out which explores the practical considerations the CAA should make if it considers implementing an option

Practical considerations made in the roadmap applied

- This shortlist was then assessed using a roadmap that focuses on the practical and implementation issues with the shortlisted options and understanding whether and how they could be used in practice (set out in the table to the right)
- This contrasts with the longlist options, which focused on the merit and overall pros and cons of each option
- At this stage, 2 workshops were conducted to test the emerging findings of the review and the approach that has been applied. Where appropriate and at the discretion of Grant Thornton, feedback has been assimilated into the review
- The detailed assessment of each option against the roadmap can be found in Appendix C. It is important to note that, while Appendix C provides a more detailed assessment of the practical considerations the CAA would have to make if it were to consider implementing an option, the analysis is still preliminary. It is recommended that further development is required by the CAA if the options are to be pursued
- Based on these considerations, in addition to the results of the framework applied to the longlist, a set of high-level findings have been established based on the evidence gathered – this is set out in the following section

Practical considerations within roadmap considered for shortlisted options

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	Likely ability of the option to contribute useful information on regulated companies' efficient costs, transparency, and ease of interpretation
How viable is the approach?	If the option requires significant resources and whether this is proportionate to the benefits expected, e.g., is a unique dataset required, are comparators difficult to identify, or are there conditions for the approach to be viable
What are the risks associated with the option?	Whether the regulated entity would challenge the option and whether there are any technical difficulties, e.g., regulatory scrutiny
What tools/techniques would be available to implement the option?	Tools and/or techniques that may be required, e.g., for econometric benchmarking, this could involve assessing OLS (Ordinary Least Squares), COLS (Corrected OLS Models), MOLS (Modified OLS Models), Data Envelopment Analysis, etc
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	Thinking about who is likely to engage, e.g., regulators, airlines, HAL, NERL, and how they are likely to respond, and if they have incentives to participate or are obligated to participate, e.g., if stakeholders are likely to object to or take interest in the analysis, or if the method creates an increased regulatory requirement on regulated entities
What are the key milestones for unlocking the option?	What the likely timescales are, the data required, and/or further steps to consider regarding the feasibility of the option
What practical/implementation barriers are likely to be faced	Considers whether there are any requirements that need to be overcome in order to implement the option
When would the method be feasible to be implemented by?	Could the option be implemented in H8/NR28, or would more time be required
Applicability to HAL/NERL	Whether the option is applicable to HAL/NERL?

Source: Grant Thornton UK LLP

05
Findings of the review

The framework and roadmap indicates multiple options for the CAA to consider, rather than a single option, using the CAA's current approach as a starting point

The findings

- The work set out in the previous section has led to the identification of a range key findings. These are set out in this section

Finding 1: The CAA's current approach is a useful starting point for the future of cost assessment

- The scope of this review does not include a full critical assessment of the CAA's current approach. It is recognised that various stakeholders have expressed strong views about the current approach to cost assessment, particularly as part of the H7 and NR23 reviews, as well as subsequently in response to the CAA's recent 'lessons learned' consultation (CAP2618)
- In particular, some stakeholders have stressed that the current approach - which emphasises adjusting cost allowances in response to volumes based on elasticity assumptions has not resulted in a close match between allowed and outturn costs
- It is difficult to determine the extent to which any difference in outturn versus allowed costs is a result of inaccuracies in the cost-volume elasticities used or under/over-performance by the regulated companies, and further work may be useful to improve the evidence base on these relationships
- Looking ahead to H8 and NR28, volume changes are likely to be less abrupt than in the last few years (during and in the aftermath of Covid-19) so that volume elasticities - whilst still important - will be less instrumental to determining appropriate allowances
- That said, no stakeholders appealed the CAA's cost assessment methodology to the CMA as part of the H7 or NR23 processes (although it should be noted that the bar for showing that any decision is inappropriate is high)
- In addition, the current approach incorporates good practice in several areas, such as the approach to real price effects and 'frontier shift' efficiency.
- As a result, it likely serves as a useful starting point for future cost assessment work, albeit potentially supplemented with other techniques (as described below)

Finding 2: There are areas where the CAA can strengthen its approach, and the benefits could be significant

- The framework applied (see Appendix B for more detail) and the roadmap set out for shortlisted options (see in Appendix C for more detail) suggest that there are a number of cost assessment approaches that are not currently being used by the CAA, but which could be viable for HAL and/or NERL
- Some of these approaches have the potential to generate significant benefits by improving the assessment of efficient costs for regulated companies and identifying potential sources of efficiency in practice
- Specifically, the CAA's current approach uses external benchmarks to a limited extent - whether from comparable company operations or theoretical benchmarks derived from methods that set targets based on a notionally efficient company, such as new entrant bottom-up analysis
- Leveraging such comparisons could prove particularly valuable, especially when they contribute to identifying the 'efficiency frontier' or benchmarks of excellence. It should be noted that the current approach does not directly focus on evaluating companies' performance relative to these benchmarks, although HAL and NERL may or may not operate at the frontier

A portfolio approach emphasising international benchmarking, targeted bottom-up analysis and gap analysis and triangulation may be an appropriate way forward

The findings (continued)

Finding 3: There is no one 'silver bullet' option but nor is pursuing too many options likely to be appropriate: prioritisation will likely be necessary

- Upon reviewing the longlist and shortlist criteria detailed in Appendix B and Appendix C respectively, it is evident that many options present various pros, cons, challenges, risks, and opportunities. This study aims to elucidate the practical aspects of each option
- Indeed, adopting a single option would entail:
  1. foregoing certain potential benefits in confidently identifying efficient costs and
  2. unnecessarily increasing the risk in future cost assessments (by over-relying on a single approach)
- Therefore, whilst there is no 'silver-bullet' option, it would be inappropriate to take techniques off the table at this stage. Simultaneously, considering the constraints of time and resources, the CAA and the industry must prioritise their cost assessment efforts to maximise the benefits from their limited resources

Finding 4: A portfolio approach emphasising international benchmarking, targeted bottom-up analysis and gap analysis and triangulation may be an appropriate way forward

- The CAA will ultimately decide how to strengthen the cost assessment approach after extensive consultation, considering the wider context of H8 and NR28 programmes, resource availability, and other factors
- However, this review seeks to offer a pragmatic overall view on the direction of travel for cost assessment, which is intended to:
  - Incorporate the tools and techniques that offer the most potential benefit for identifying and confidently establishing efficient expenditure while
  - remaining realistic about the level of resources that the CAA and the industry can reasonably allocate in the foreseeable future
- Rather than selecting a single option from those outlined in the previous section, this approach involves integrating the most valuable aspects of various options to develop a coherent strategy that delivers benefits in the short, medium, and long term
- Overall, this work has pointed to supplementing the CAA's current approach with:
  1. International benchmarking. Whilst challenging, the benefits – especially over the long term – of international benchmarking could be game-changing for CAA's cost assessment activities. In the short-run, a natural starting point may be to conduct unit cost analysis (or simple econometric analysis), which the CAA has already explored in the case of NERL in NR23. More recently, the U.S. Air Traffic Organization and Eurocontrol have explored the operational and economic Air Traffic Management (ATM) performance of 34 airports [3]
  2. Targeted bottom-up analysis. While a comprehensive analysis of all HAL/NERL costs is unlikely to be proportionate, identify areas for detailed investigation could yield significant benefits, even in the short term

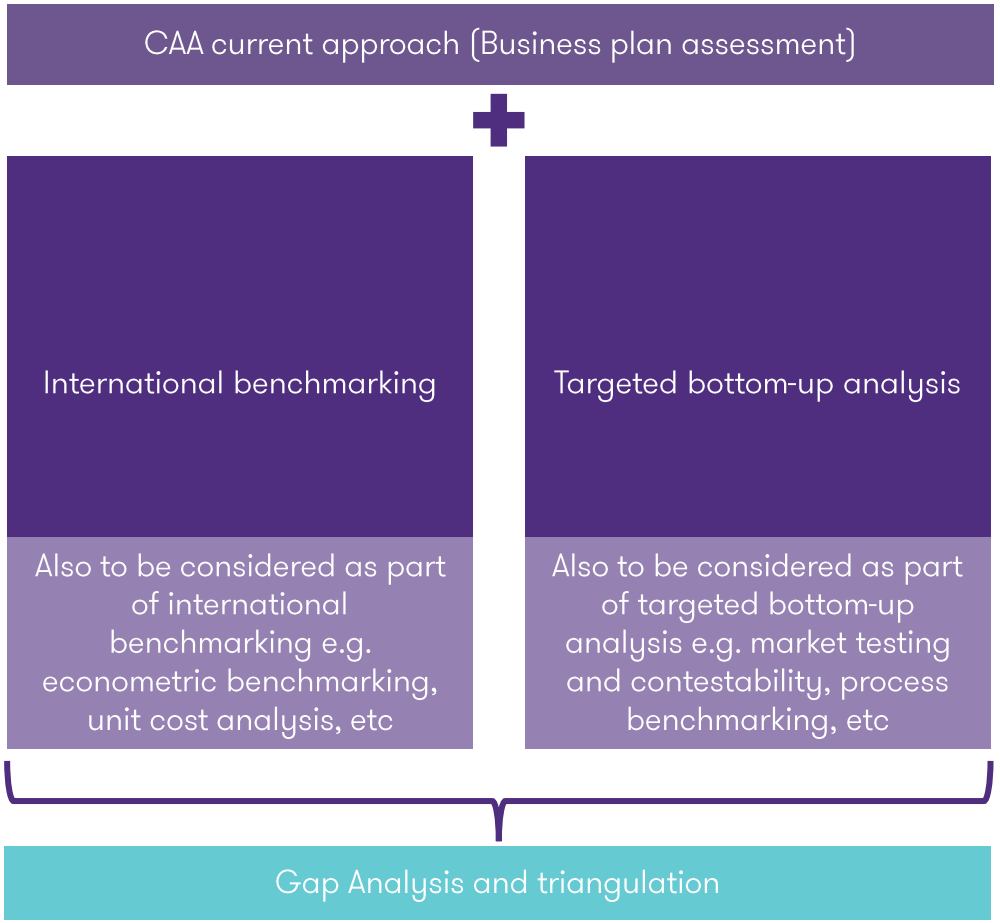
A portfolio approach emphasising international benchmarking, targeted bottom-up analysis and gap analysis and triangulation may be an appropriate way forward (continued)

The findings (continued)

3. Gap analysis and triangulation. With multiple cost assessment approaches potentially being brought to bear in future, the opportunity arises to strengthen understanding and increase confidence in findings by triangulating results of different approaches and focussing on the sources of any efficiency gaps found

- The idea of using a portfolio of approaches should be considered in the context of precedent in other European countries when setting revenue allowances. For example, cost assessment for AENA in Spain is based on the DORA (Airport Regulation Document) framework, which takes a top-down assessment of AENA's costs, using historical costs to set allowed revenue (it is worth noting that AENA is subject to a dual-till approach). [4] In contrast, Dublin Airport in Ireland is subject to a single-till approach, with its cost assessment, particularly for opex, based on a bottom-up analysis [5]
- The diagram to the right illustrates this, with following pages providing a detailed examination of the options with the greatest potential to strengthen the CAA's cost assessment approach

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

International benchmarking is a viable option, although there are several challenges to be considered

The findings (continued)

Finding 5: International benchmarking will be challenging (especially for HAL), but it is likely to be viable for both HAL and NERL

- International benchmarking will likely prove challenging for several reasons, for example:
    1. Unlike the domestic benchmarking conducted by regulators such as Ofwat and Ofgem, close comparators in aviation are outside the CAA's jurisdiction, meaning there is no ability to enforce compliance or ensure data/reporting consistency
    2. In contrast to other UK regulatory settings, the CAA must select its sample of comparators. Choosing the right comparators is challenging and can significantly influence the inferences drawn from the benchmarking
    3. Resource demands are likely to be significant for both the CAA and the industry. For instance, based on the experiences of other regulators, the CAA alone may need to dedicate multiple FTEs and/or substantial consultancy resources
    4. There will be inherent differences in the assets of the airports and ANSPs selected for international benchmarking purposes
- However, provided that the analysis is undertaken carefully, and the results are interpreted appropriately, it is likely to be a viable exercise, especially given the datasets now available. For example, HAL initiated international econometric benchmarking as part of the H7 process, and several international airport benchmarking datasets are available. For NERL, output variables and reporting are well-defined by Eurocontrol, facilitating easier comparisons, with econometric benchmarking studies already explored by Eurocontrol [6],[7]. The table to the right outlines potential solutions to the challenges noted

Challenges with international benchmarking and potential solutions

Challenges identified	Potential solutions and thoughts for the CAA to consider
International benchmarking jurisdiction. The issue of jurisdictional constraints in international benchmarking, unlike domestic practices overseen by regulators such as Ofwat and Ofgem, poses a significant challenge for the CAA.	One solution could involve bilateral agreements or standardised reporting frameworks endorsed by international aviation bodies, enhancing transparency and comparability despite varying regulatory landscapes. For NERL, a natural starting point would be to leverage Eurocontrol data, which international Air Navigation Service Providers (ANSPs) engage with, providing uniform data reporting. Regarding HAL, it may be appropriate for CAA to commission a review of HAL's international benchmarking study conducted during H7, focusing on the dataset used and how it could be developed to form the basis of international benchmarking going forward (see also below).
Selection of Comparators. Unlike other UK regulatory settings where comparators are often predefined, the CAA faces the unique challenge of selecting appropriate international comparators for benchmarking purposes.	To address this, the CAA may wish to consider adopting a rigorous selection process based on predefined criteria and industry consultation. This approach aims to minimise bias and ensure that benchmarking outcomes accurately reflect industry performance. Once again, the CAA may wish to evaluate the comparators used in the HAL international benchmarking report and ANSPs that participate in data reporting to Eurocontrol. In addition, econometric techniques could be used to help adjust for differences across comparators.
Resource Demands. Drawing from the experiences of other regulators, it is evident that substantial human and financial resources will be required.	The CAA may wish to include phased implementation plans, leveraging existing expertise, and exploring partnerships with industry stakeholders to optimise resource allocation and efficiency. It is recommended that the CAA establish a clear strategy for deploying international benchmarking before committing permanent resources. CAA may wish to consider securing funding for in-house and external resource to push forward international benchmarking.
Inherent Differences in Assets. There will be inherent differences in the assets of the airports and ANSPs selected for international benchmarking purposes, particularly for airports.	The CAA should consider adopting a robust methodology that addresses asset variations, potentially through normalisation techniques or industry-specific adjustments, to ensure fair and meaningful comparisons. Econometric techniques are likely to be useful in this respect.

Source: Grant Thornton UK LLP

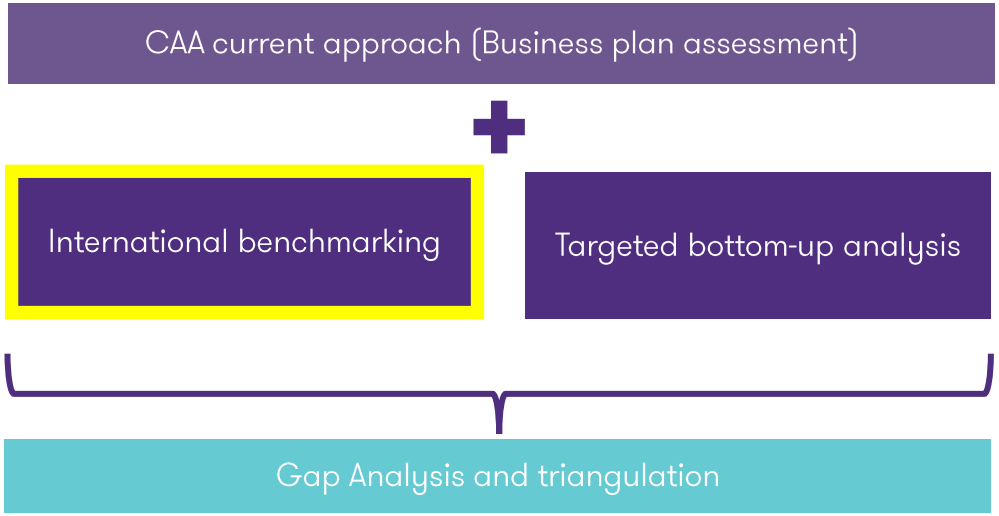
International benchmarking is a viable option, although there are several challenges to be considered (continued)

The findings (continued)

Finding 6: International benchmarking is a long-term project that evolves over time, and its benefits will take time to be fully realised

- Due to the challenges described, international benchmarking is unlikely to yield clear, definitive conclusions in the short term (e.g. during H8 or NR28). However, it can still provide useful evidence to corroborate or refute other information, suggest improvement ideas, or identify areas for further investigation
- As differences in substance and reporting between assets/companies are better understood over time, or even through cross-border collaboration among regulatory bodies in the longer term, it may become possible to make more precise judgments about the relative efficiency of companies based on international benchmarking
- The technical approaches used may also evolve with time. Initially, simple comparisons using unit costs or simple econometric models may be most appropriate, while more sophisticated econometric methods may become viable with greater confidence in the data and a better understanding of the assets being compared
- In practice, this is likely to require significant commitment of resources from the CAA. Drawing on experiences from other sectors, this would typically involve allocating at least one full-time equivalent (FTE) staff member with expertise in regulatory benchmarking, supported by appropriate consultancy services
- The CAA may also wish to consider enhancing its proficiency in empirical methodologies like econometric benchmarking and unit cost analysis, drawing on lesson in sectors such as rail, water, and energy. This could involve recruiting external experts and participating in training programmes from universities or specialised institutions
- This approach is particularly relevant to opex, given the comparability of costs among airports and ANSPs in this domain. Recognising the intricacies of international benchmarking and the importance of meticulous planning in future price controls, the following page outlines an indicative timeline for consideration
- The timeline proposes potential steps that the CAA could adopt to integrate international benchmarking into its regulatory toolkit.
- While this plan provides a high-level overview, its primary objective is to outline key milestones for the CAA to strive towards, acknowledging that this process will unfold gradually
- It is important to emphasise that this plan is illustrative and would likely require ongoing adjustments and periodic review.

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

International benchmarking is a viable option, although there are several challenges to be considered (continued)

Result
- Achieve a comprehensive understanding of the pros, cons, opportunities, challenges, and risks associated with international benchmarking
- Fully comprehend data sources, including key issues
- Use straightforward econometric benchmarking and/or unit cost analysis to verify cost assessment conclusions and potentially uncover efficiency opportunities

Actions needed to achieve result
- Allocate sufficient resources to top-down benchmarking activities (e.g. one FTE, senior oversight plus consultancy resource)
- Select appropriate datasets for international comparisons (e.g., dataset used in HAL's econometric benchmarking study) – likely involving industry consultation
- Identify suitable international airports for comparison – likely involving industry consultation
- Thoroughly examine datasets to understand key nuances (e.g., variations in reporting/definitions across jurisdictions, position in asset cycles, etc.)
- Develop initial insights into cost drivers and methods for measurement
- Determine approaches for adjustments (e.g., for exchange rates, purchasing power, etc.) and conduct preliminary analyses (e.g., unit cost analysis, corrected OLS)
- Validate analyses through peer review and industry consultation
- Integrate analysis results into cost assessment, appropriately addressing weaknesses

Result
- International benchmarking is integral to the cost assessment programme, acknowledging limitations such as data comparability
- This effort contributes to shaping an emerging perspective on HAL and NERL's efficiency relative to the global frontier and identifying potential efficiency drivers

Actions needed to achieve result
- Initiate discussions with international regulators to explore the feasibility of a collaborative benchmarking exercise across airports globally (to enhance data consistency, etc.).
- Review and audit underlying data rigorously
- Emphasise enhancing data quality and comparability across benchmarked assets
- Evaluate additional data requirements for ensuring accurate comparisons
- Focus on comprehending the assets under comparison to inform assessments (e.g., identifying uncontrollable structural differences, different stages in the asset cycle)
- Explore advanced benchmarking techniques as deemed suitable

Result
- International benchmarking is integral to the cost assessment programme, relying on robust international comparisons
- Regulators are collaborating across borders to harmonise data, facilitating meaningful and robust comparisons to assess firms' efficiency and pinpoint areas for improvement

Actions needed to achieve result
- Engage in an international benchmarking exercise in collaboration with international regulators to enhance the robustness of comparisons
- Concentrate on identifying any efficiency gaps (if present) and determine practical actions needed to achieve improvements.

International benchmarking is a viable option, although there are several challenges to be considered (continued)

The findings (continued)

Finding 7: Existing datasets may be a natural starting point, but are not perfect and will need to be analysed with care

- Datasets already exist to facilitate benchmarking for both HAL and NERL (see detailed framework applied to Option 4: Top-down econometric benchmarking – Appendix B) and appear to offer a useful starting point for international benchmarking. Below, data sources in the case of HAL and NERL are discussed in more detail

HAL

- For HAL, there are a number of datasets that could be used to start the international benchmarking process. These include the data used in KPMG's Airport Operating Cost Efficiency Benchmarking study for HAL, ATRS Global Airport Benchmarking Report, Jacobs Airports Performance Indicators report and Airport Benchmarking Group
- Of these, the most developed and context-specific dataset appears to be that used as part of KPMG's Airport Operating Cost Efficiency Benchmarking study commissioned by HAL. This dataset was developed as part of the H7 process in a helpful initial study on international benchmarking. It is worth noting that HAL as part of questions asked in the Phase 1 clarified that it would be recommissioning an update of this study
- This dataset is based on statutory accounts from a large number of international airports. The use of statutory information has the benefit of supporting comparability across airports. The downside of this approach - which CAA and the industry may wish to address over time - is that information (e.g. on costs and cost drivers) is less granular/detailed than would ideally be the case (compared to the information available to Ofwat and Ofgem in their benchmarking of companies in the UK)
- This dataset includes a substantial number of comparator airports (28 in total). While having more comparators is generally beneficial, many of these airports, particularly smaller ones, may be so fundamentally different from HAL that they provide limited insight into the efficient costs of an airport with Heathrow's size, nature, and complexity. This issue is compounded by the limited information available on cost drivers
- A key priority for CAA will therefore be to explore how to use this dataset to form a robust view on efficient costs by prioritising international airports that provide the most valuable insights into the efficient operations of an airport like HAL. This may involve considering only a subset of the most similar airports, testing the sensitivity of results to the chosen sample, and using different functional forms in any econometric analysis
- Given the above, CAA may wish to commission/conduct a review of KPMG's Airport Operating Cost Efficiency Benchmarking study, focussing on the underlying dataset

NERL

- For NERL, the natural starting point and key source of data would be the Air Traffic Management Cost-Effectiveness (ACE) benchmarking report, given its standardised reporting format adhered to by 38 ANSPs across Europe
- The report and underlying dataset, produced by Eurocontrol, focuses on Air Traffic Management (ATM) and Communication, Navigation, and Surveillance (CNS) costs, analysing the cost-effectiveness of ANSPs through three key cost drivers: productivity, employment costs, and support costs
- For both HAL and NERL, the datasets will inevitably be imperfect, with issues that may only become known after thorough investigation. These datasets will need to be interpreted and ~~analysed with considerable care~~

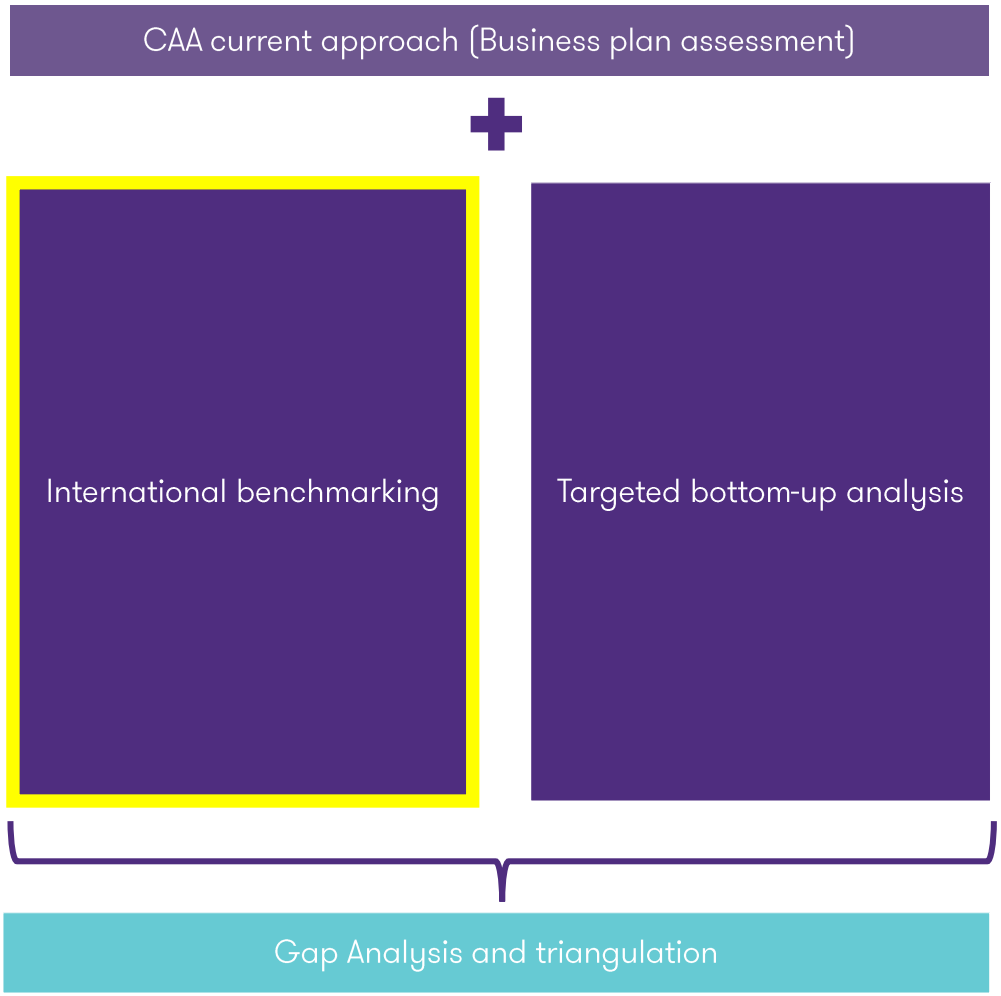
International benchmarking is a viable option, although there are several challenges to be considered (continued)

The findings (continued)

Finding 8: There is an important role for the whole industry on international benchmarking, but ultimately CAA will need to be close to the detail to make key technical decisions

- International benchmarking will work best with participation from all sides of the industry. Arriving at the correct analysis will require challenge from different viewpoints and the practical understanding of the assets that only the industry can bring
- However, following practices in other sectors, the CAA, as the independent regulator, must be sufficiently involved in any analysis to make informed judgments about key analytical decisions, such as:
  - which companies/assets are the appropriate comparators
  - what econometric or other techniques should be used, and
  - what are the appropriate 'control' variables in any analysis

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

Targeted bottom-up analysis may be a more feasible option in the short-term, although it will need to be used in the right areas

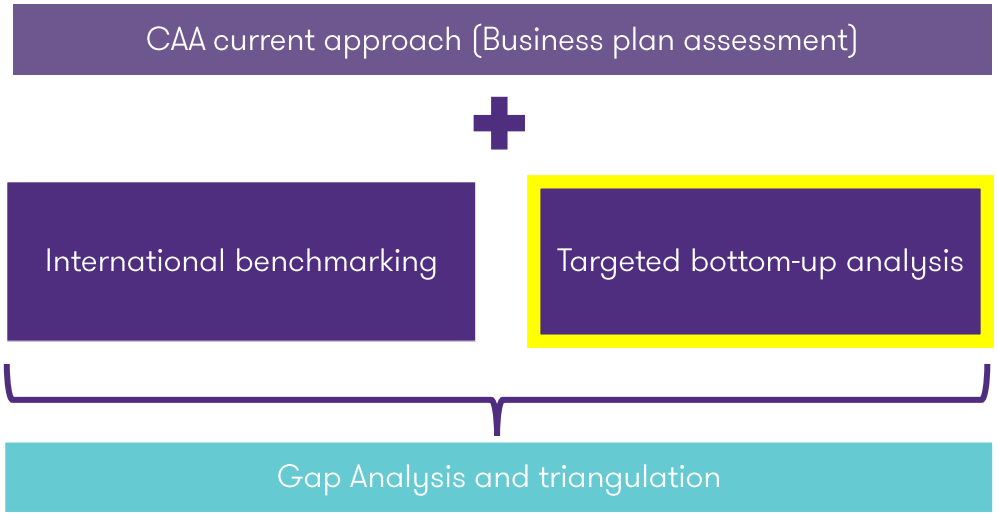
Finding 9: For bottom-up analysis to have most impact, it needs to be targeted in the right areas

- Bottom-up analysis, and more generally, a more detailed assessment of HAL and NERLs' cost base, has been advocated by many stakeholders. While the benefits of this approach are clear, it needs to be undertaken proportionately
- Resources of HAL/NERL, their customers, and the CAA are limited, and detailed analysis, which can be time-consuming and costly, should only be undertaken where the benefits clearly outweigh the costs
- This requires targeted bottom-up analysis. Priority should be given to areas of the cost base where uncertainty exists regarding HAL/NERL performance or where substantial evidence has been presented that there may be material difference in forecast vs outturn costs
- To ensure that the approach is proportionate and is value-for–money, the following should be considered:
  - Size i.e. the materiality of the costs in question. Prioritising areas where costs are largest ensures that efforts are focused where findings can yield significant financial benefits
  - Controllability, in terms of the ability for HAL/NERL to influence the cost. Costs that HAL/NERL can control are more likely to respond to cost reduction measures identified through bottom-up analysis
  - How far HAL/NERL is away from the frontier and whether any costs reduction will lead to substantial efficiency gain
  - The extent to which cuts can be made as a result of bottom-up analysis (if any) without negatively effecting output/outcomes
- In practice, targeted bottom-up analysis could be applied to opex, capex, and commercial/non-regulated revenue, provided strong evidence presented by stakeholders justifies the need for assessment

Finding 10: The industry should have a central role in any targeted bottom-up analysis

- The industry – HAL and NERL respectively, and their customers – should have a central role in any targeted bottom-up analysis, particularly in determining which areas of the cost base are subject to greater scrutiny and potentially in terms of undertaking any analysis. It may be appropriate for CAA to rely on the industry more for bottom-up analysis than top-down (international) analysis.
- After all, as stewards of the asset, the regulated businesses know their cost base better than anyone. Likewise, customers, such as airlines, are uniquely placed to offer hypotheses on where opportunities for efficiency lie based on their experience of engaging with multiple airports/ANSPs around the world

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

Targeted bottom-up analysis may be a more feasible option in the short-term, although it will need to be used in the right areas (continued)

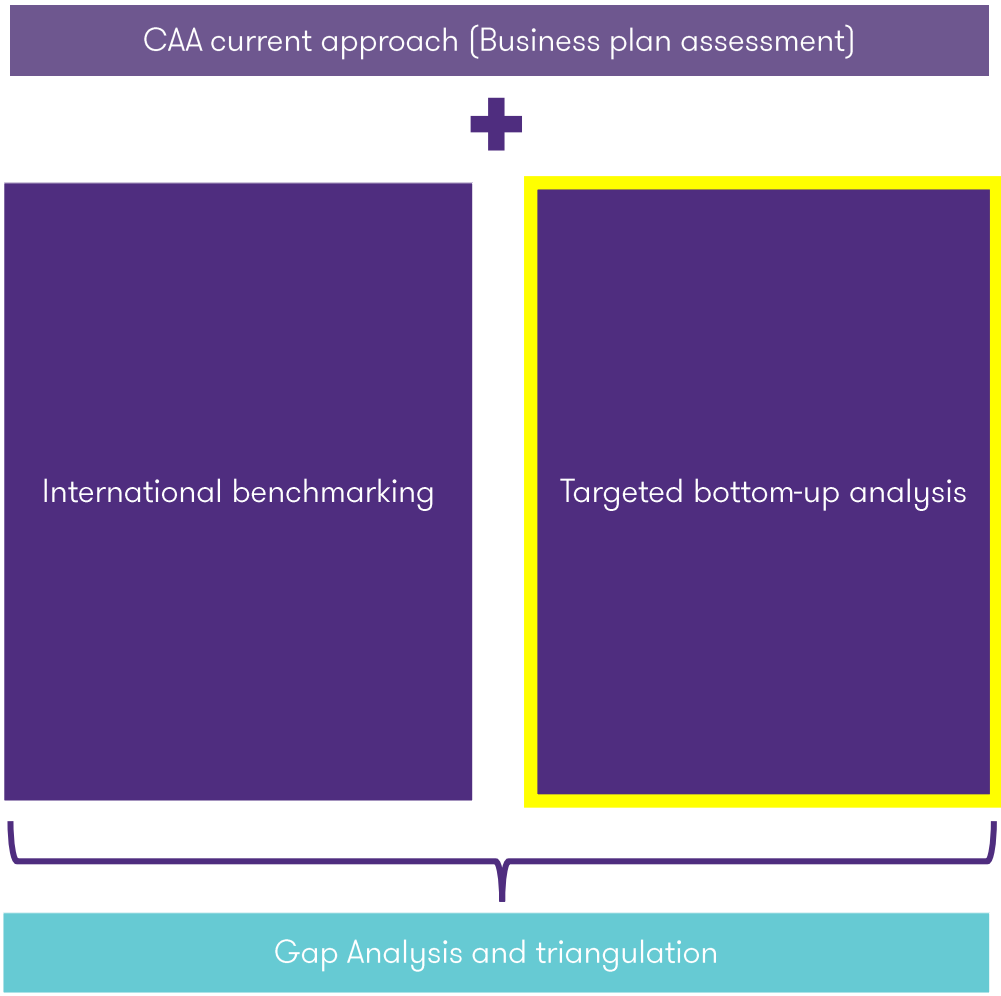
Finding 11: It may be helpful to introduce an explicit process – involving stakeholders – to identify the most suitable areas for targeted bottom-up assessment and implement any analysis

- Given the central role of the industry in this endeavour, it may be appropriate for the CAA to introduce an explicit process of consultation to determine: (a) the most suitable areas of the cost base for bottom-up assessment, (b) the most appropriate tools and techniques to deploy, and (c) who should undertake the assessment (eg the regulated companies, external advisors, customers, etc.)
- This could take the form of a formal process where ideas and hypotheses for areas of work are put forward in writing, tested, debated, and, if appropriate, acted upon if the evidence is sufficient, mirroring the Cost Adjustment Claim process in the water sector. Alternatively, it could be governed more informally through dedicated working groups

Finding 12: A range of techniques may be appropriate in implementing targeted bottom-up analysis

- Various bottom-up techniques may be suitable depending on the specific cost area, such as process benchmarking, market testing and contestability, and new entrant bottom-up analysis. In particular:
  - Market testing and contestability: Ideal for evaluating cost savings and efficiency in procuring large capital programmes
  - Process benchmarking: Focuses on identifying best practices for specific processes, impacting both opex and capex
  - New entrant bottom-up analysis: Potentially effective for scrutinising HAL/NERL's opex efficiency levels and defining what efficient costs should resemble relative to outturn costs

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

Gap analysis and triangulation should be the foundation of any future approach considered to strengthen the CAA's current approach

The findings (continued)

Finding 13: None of the techniques – CAA's existing approach, international benchmarking, targeted bottom-up analysis or anything else – should be viewed in isolation: the whole body of evidence should come together to help form a balanced view of costs

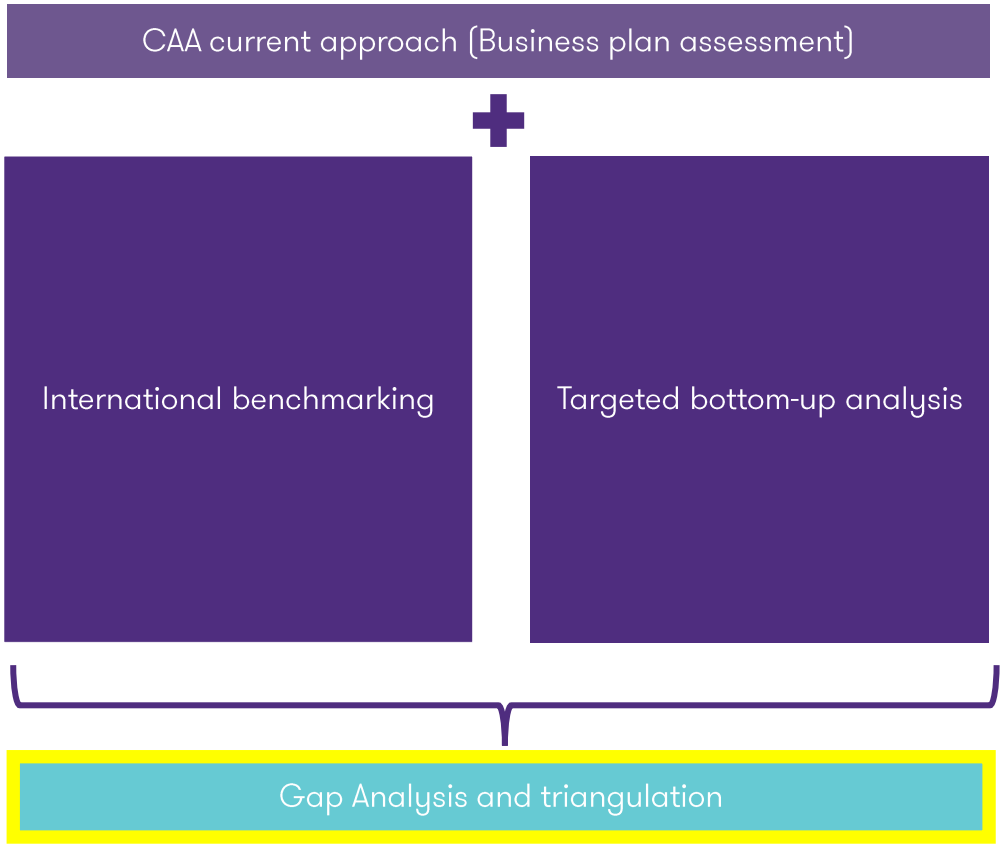
- As emphasised in several places in this report, no single approach to cost assessment is perfect, and all approaches have their strengths and weaknesses. In this context, the most accurate assessment of HAL and NERL's costs is likely to come from pursuing a range of techniques, being explicit about their strengths and weaknesses, and forming a view of costs that weighs the various sources of evidence. The benefits of such an approach include:
    1. Increasing confidence and precision in the conclusions of cost assessment exercises
    2. Reducing the risk of error (relative to using a single approach)
    3. Enhancing the overall transparency of the CAA's cost assessment approach
    4. Uncovering information about the sources of efficiency (not just the size of any possible efficiency gap)

Finding 14: Developing a clear framework to triangulate approaches, identify gaps, and determine how the CAA will use different sources of evidence for cost assessment conclusions may be beneficial

Such a framework could describe what level of evidence/assurance the CAA would expect in order for a source of evidence to inform its decision-making; what level of reporting/documentation CAA would expect; how CAA would expect the maturity of the evidence base to evolve over the course of its periodic review process (and the relevant inputs), etc.

- By providing clarity to stakeholders, such a framework could help engender the most useful possible participation from stakeholders and, in so doing, help deliver more robust outcomes from the cost assessment workstream

Possible approach to strengthening the CAA's current approach



Source: Grant Thornton UK LLP

Appendices

A. Detailed summary of the CAA's current approach

A. H7 – setting opex and capex allowances

- This section sets out a qualitative description of the approach the CAA has taken to setting opex allowances in H7. The summary below has been informed by a summary note provided by the CAA, supplemented by the H7 FD

Operating expenditure

- The CAA and its advisors set operating expenditure (opex) allowances for HAL by categorising costs (e.g., People, Operational, Facilities, etc.) and establishing a baseline using HAL's historical 2019 opex using its business plan. Adjustments were then made to this baseline to estimate an efficient baseline. The adjustments made are outlined below

Adjustment 1 – Determine 'efficient' baseline

- This involved adjusting the baseline for elements such as deducting efficiency savings from "Cost of Change" programme (changes to staff legacy terms and conditions that have been agreed with airlines), adding cost increases due to London Living Wage, deducting efficiency savings renegotiation of the baggage contract and other efficiency adjustments to cost categories [8]

Adjustment 2 – Adjust efficient baseline for volume changes and "cost elasticity" effects

- Volume adjustments, in the form of elasticities, were applied to account for how responsive a cost category is with passenger volumes. For example, for the variable component of security staff, the CAA estimated the elasticity with respect to passenger numbers to be 0.7. Typically, CAA used elasticities below 1 to recognise scale economies in HAL's operations [9]

Adjustment 3 – 'real price effects' and ongoing productivity improvement

- Price adjustments were made to account for variances in input prices faced by HAL relative to consumer price inflation
- e.g. Office for Budget Responsibility (OBR) wage series was used for people costs; a HAL bespoke series for utilities, etc. [10] A 1% pa ongoing efficiency improvement assumption was also applied to all categories except for pension costs, rates, distribution contracts and overlays (material/significant expected changes too HAL's cost base), to reflect general improvement HAL is expected to make across H7 [11]

Adjustment 4 – overlays & possible future adjustments for uncertain items

- Overlays were assessed to capture the effect of factors expected to occur (or cease) during H7 e.g. Covid-19, enhanced service, resilience etc. and future adjustments that are difficult to forecast e.g. business rates and pension deficit repair contributions
- The next slide sets out the approach taken by the CAA when setting capex for H7

A. H7 – setting opex and capex allowances (continued)

- This section sets out a qualitative description of the approach the CAA has taken to setting capex allowances in H7. The summary below has been informed by a summary note provided by the CAA, supplemented further by the H7 FD

Capital expenditure

- The CAA assessed HAL's "efficient" capex baseline considering project maturity and data quality through a two-stage process: a 'needs' assessment and an efficiency assessment (defined below). Additionally, it established a governance framework and uncertainty mechanism for airline stakeholders to review programmes and for HAL to request capex cap adjustments. The CAA and its advisors use HAL's business plan to guide its conclusions

'Needs' assessment of capex

- The CAA built up the 'needs' assessment of costs by allocating projects and programmes into categories according to data quality and the overall business case for the project. Four categories were defined: 1) required project by consumers/HAL called 'core' capex (included in efficient baseline) ; 2) projects that are likely to be deemed as core capex but are either are at an early stage of maturity and/or there is insufficient information to assess (included but require approval); 3) 'discretionary' projects that may be required (included rarely) and; 4) projects viewed as 'not required' i.e. unlikely to be required during H7 (not included)

Efficiency assessment of capex

- Efficiency assessment of capex has been conducted by the CAA and its advisors by assessing three categories: 1) conducting engagement with HAL to seek clarification on the basis for its proposed programmes and spend e.g. regulated security, T2 baggage, etc.; 2) 'top-down' assessment of total costs, by programme e.g. drawing on historical delivery and spend profiles and 3) 'bottom-up' analysis conducted by CAA's advisors to cross check unit rates against internal benchmarks of similar programmes [12]

Capex governance framework and envelope uncertainty mechanism

- The CAA has in place the capex governance programme, which allows stakeholder to scrutinise programmes but also bring projects forward, if required, which is ongoing throughout H7. HAL also has the opportunity to extend the price cap twice, permitting core and development capex projects an additional 5 percent
- The next couple of slide sets out the approach taken by the CAA when setting opex and capex allowances for NR23

A. NR23 – setting opex and capex allowance

This section sets out a qualitative description of the approach the CAA has taken to setting opex allowances in NR23. The summary below has been informed by a summary note provided by the CAA, supplemented further by the NR23 FD

Operating expenditure

- The CAA and its advisors assessed opex allowances for NERL through three defined categories: 1) staff costs (which make up a large proportion of NERL's opex); 2) non-staff opex; and 3) pension costs. Similarly to H7, the CAA considered the use of an appropriate inflation measure and considered whether there are any real price effects. The CAA and its advisors used NERL's business pan as the base to its assessment

Staff costs

- A productivity improvement of 1.5% pa. for operational staff and 0.5% pa. for non-operational staff starting from 2024 was determined through unit cost analysis (the CAA's advisors also conducted a top-down benchmarking exercise with international Air Navigation Service Providers, although this was not instrumental in the final allowance that was set). This is tied to traffic volume recovery and NERL's forecasted technology transformation capex. Additionally, an average wage growth increase of CPI+0.25% for all staff during NR23 was established, informed by pay settlements from 2023 to 2025 and evidence from UK pay negotiations

Non-staff costs

- The CAA updated NERL's allowance for the latest available information on CAA Scheme of Charges for FY23/24. Additionally, Defined Benefit Management Costs were aligned with the Initial Proposals (IPs) to reduce NERL's administrative costs in line with benchmarks outlined in the Government Actuary's Departments (GADs) supplementary report [13]
- Efficiency gains from RP3 capex projects not yet factored into NERL's forecast costs were also considered, with an estimate of these efficiencies incorporated into the projections
- Regarding Unmanned Aircraft System Traffic Management (UTM) development fees, the CAA continued to exclude these costs from the baseline allowance, anticipating that NERL will establish new charging arrangements in NR23 to recover the associated costs [14]

Pension costs

- Defined benefit (DB) and defined contribution (DC) pension costs were reviewed by the CAA's advisors and GAD. The CAA updated the review with recent information published by the Pensions Regulator and with available benchmarks. The CAA set DB contribution and deficit repair pension costs in line with the mid-point of the range of reasonable and efficient costs estimated by GAD (based on comparator DB pension schemes). DC pension costs were adjusted to reflect an assumed 12% average contribution rate for new joiners, based on its advisors benchmarking and in-house analysis. DB and DC pension costs were adjusted in proportion to the adjustments made to staff costs. There were no adjustments to Pension Cash Alternative (PCA) costs

Inflation adjustment, real price effects and ongoing productivity efficiency

- For cost items comprising a substantial portion of NERL's overall costs, the CAA conducted a high-level review to gauge the inflation impact. The CAA determined that NERL's costs were not significantly different from general inflation. Hence, the CAA used the latest OBR CPI forecasts for inflation adjustments

A. NR23 – setting opex and capex allowance (continued)

This section sets out a qualitative description of the approach the CAA has taken to setting capex allowances in NR23. The summary below has been informed by a summary note provided by the CAA, supplemented further by its H7 FD and work conducted by its consultants when preparing for NR23.

- This section sets out a qualitative description of the approach the CAA has taken to setting capex allowances in NR23. The summary below has been informed by a summary note provided by the CAA, supplemented further by the NR23 FD

Capital expenditure

- The approach to setting capex allowances primarily relied on assessing NERL's business plan with minor adjustments to NERL's February 2022 submission. Following its January 2023 submission, the CAA considered budget allocation differences, notably a significant reduction in the risk and contingency allowance. Additionally, the CAA initiated a strengthened capex monitoring framework for NR23, involving both ex-ante efficiency assessments potentially integrated into NR28, and ex-post reviews of key RP3 and NR23 programmes. [15] Adjustments to NERL's NR23 capex forecasts included provisionally allowing reductions in capitalised staff costs and rejecting attempts to reclassify £15 million of IT costs as opex, thereby increasing capex by this amount. The CAA also engaged independent advisors to review NERL's capex forecast, primarily focusing on governance, planning, and process improvements rather than direct cost assessments [16]

A. H7 & NR23 – setting commercial revenue/non-regulated revenue allowance

This section sets out a qualitative assessment of the approach the CAA has taken to assessing commercial / non-regulated revenues for in H7 and NR23. The summary below has been guided by a summary note provided by the CAA, supplemented further by the H7 and NR23 FD

H7

Determine 'efficient' baseline

- The CAA and its advisors use HAL's business plan alongside efficiency targets in the form of a management stretch and other challenges when setting commercial revenue allowances (although HAL takes a bottom-up analysis of some of its commercial revenue categories e.g. retail). The CAA's advisors followed a similar framework to that applied in setting opex allowances, described as a "base year - roll forward approach", in which baseline commercial revenue costs were considered to be a reasonable starting revenue base from before the Covid-19 pandemic, making appropriate allowances for long-term growth in revenue per passenger, and factoring in specific revenue opportunities/challenges during H7 [17]

Sense checks

- The CAA then conducted sense-checks on the roll forward approach by comparing HAL's commercial revenues from before the Covid-19 pandemic with those projected for the end of the H7 period - assessing trajectory alignment with expectations

Overarching approach and reassurance taken by the CAA and its advisors

- The CAA base the overall assessment in a broader top-down context for a comprehensive view, asking its advisor to assess assumptions/methodology for commercial revenues alongside its cost assessment work

Challenging projections

- The approach involved implementing a "management stretch" (estimated by evaluating the effectiveness of capex allowances in driving revenue growth, analysing the sustainability of historical macroeconomic trends driving revenue, assessing HAL's exposure to known and unknown headwinds, and considering the regulatory novelty of management stretch targets within Heathrow's single till price control framework) challenge, projecting a 1% annual growth in revenue per passenger for efficient operation. It also considered recent changes in VAT on airside transactions and duty-free rules, expecting them to impact retail revenues less than initially assumed by HAL. Different "mode share" estimates for airport transportation were used, leading to higher overall commercial revenues. Additionally, the prediction was made that the introduction of Elizabeth Line services would take time to fully impact revenues generated from Heathrow Express, based on the offered service pattern

NR23

- The CAA primarily uses NERL's business plan when setting non-regulated revenue allowances. It considered the forecasts proposed in NERL's business plan to be broadly reasonable and made updates to the allocations of Determined Costs for London Approach and the Ministry of Defence contracts to reflect changes to Determined Costs compared with NERL's business plan[18]

B. Detailed Longlist options assessment

B. Option 1: Unit cost analysis

Unit cost analysis involves evaluating costs per unit of output or service, either across different companies or internally. In this analysis, the unit serves as a key cost driver for the output being measured.

Criteria	Explanation and RAG scoring against criteria	
Data availability	Data for HAL and NERL is available to conduct unit cost analysis, although concerns on data availability arise when assessing comparative unit cost analysis with firms from other sectors and jurisdictions. Potential data sources include, e.g., ATRS Global Airport Benchmarking Report, and ATM Cost-Effectiveness (ACE) benchmarking report.	
Approach used by CAA	Yes, for example: NR23. CAA's consultants conduct unit cost analysis to assess staff costs using both domestic and international comparators. [19]	
Regulatory precedent	ORR, Network Rail. Compares maintenance expenditure and conventional track renewals unit costs across Network rail's regions for CP7/PR23. However, there is recognition that the technique has limited value even in the context of a particular company because unit costs are driven by so many different factors and therefore have limited applicability in measuring efficiency/performance. [20]	
Time/resource constraints	While the necessary data may already be available, this approach can be time-consuming, especially if there are complexities in cost allocation.	
Transparency	High transparency as it clearly identifies which specific costs are apportioned to each activity.	
Proportionality	This approach is already applied to some costs, meaning that the CAA is already familiar to it and has the resources to conduct it. It is a simple approach and may be a more proportionate option than more sophisticated econometric techniques.	
CAA's objectives other than cost	N/A	
Wider issues	Allocating indirect costs (e.g. overheads) may require complex allocation methods, introducing uncertainty and subjectivity. Comparing unit costs across different entities can be challenging (e.g. larger companies may benefit from economies of scale while smaller companies do not).	

Suitability for shortlisting: Low (already adopted)

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

This option rates 'Low' on suitability for shortlisting as the CAA already effectively uses this option to some extent. However, it may be worth considering whether it is feasible to apply this approach to a wider range of cost components, especially domestically/where there may be more comparability e.g. MAN and LGW.

Overall viability for NERL

This option rates 'Low' on suitability for shortlisting as the CAA already effectively uses this option to some extent (e.g. unit cost analysis had been conducted for staff costs comparing other domestic ANSPs and other entities and international ANSPs). However, it may be worth considering whether it is feasible to apply this approach on a wider range of cost components (e.g. other than staff cots).

B. Option 2: Process benchmarking

Comparing business processes from a regulated entity to other entities to identify best practices and areas for improvement.

Criteria	Explanation and RAG scoring against criteria	
Data availability	Data is generally sensitive and difficult to obtain. Airport Benchmarking Group (ABG) might already collect some relevant data on a selection of airports, aiming at identifying and understanding best practices.	
Approach used by CAA	Some precedent of the CAA commissioning process benchmarking studies e.g. an assessment of specific operating activities and processes, including passenger security screening, management of passengers with reduced mobility, trolley management, management of check-in infrastructure and baggage systems, and airside and perimeter security.	
Regulatory precedent	Ofcom used surveys and case studies of international operators to identify best-practices for a number of specific processes during the 2006 price control review. [21] Precedent from ORR and Ofwat but, to the best of our knowledge, not recent.	
Time/resource constraints	Having an in-depth understanding of processes would likely require extensive engagement and collaboration with relevant entities. This, along with gathering and collecting data, would make the process time and resource-intensive.	
Transparency	Could improve transparency but will depend on the willingness of entities to share information. Unlikely to require complex statistical techniques (often based on KPIs and detailed internal systems).	
Proportionality	Could be proportionate if undertaken in a targeted way.	
CAA's objectives other than cost	Potential to highlight necessary managerial changes to unlock benefits; improve customer satisfaction and quality of services.	
Wider issues	Relies on organisations having comparable processes. It emphasises how outcomes are delivered, rather than the what, which might not be in line with regulators' focus on output-based regulation.	

Suitability for shortlisting: Low (lack of recent precedent)

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

May be appropriate in certain circumstances – will need to be undertaken in a highly targeted manner (see findings above).

Overall viability for NERL

May be appropriate in certain circumstances – will need to be undertaken in a highly targeted manner (see findings above).

B. Option 3: Hypothetical new entrant bottom-up analysis

Constructing a cost base of a hypothetical efficient company by breaking down the activities required and their associated costs. Usually done by analysing the costs of individual activities or components, based on engineering or quantity survey data.

Criteria	Explanation and RAG scoring against criteria
Data availability	Relies heavily on expert judgment and input and building a 'model' of an efficient version of the asset. By its nature, requires extensive and detailed information about all aspects of the regulated business's activities.
Approach used by CAA	No, although the CAA commissioned advisors for H7 to conduct a capex plan review where bottom-up analysis e.g. for Asset Management & Compliance, a site visit to a baggage facility was conducted to feed into an assessment of the condition of the asset. [22]
Regulatory precedent	Some precedent from other sectors, especially telecommunications.
Time/resource constraints	Can be very time-consuming and resource-intensive (e.g. requires communication and co-ordination with experts).
Transparency	Models are necessarily complex and unclear as to how representative they may be. However, bottom-up analysis could be useful in addressing specific concerns that arise during the review process, ensuring the robustness of the analysis.
Proportionality	Could shed lights on specific issues when used in conjunction with other options. However, it is both time and resource intensive. Investment therefore needs to be carefully considered.
CAA's objectives other than cost	N/A
Wider issues	While it allows for consideration of broader issues (e.g. project feasibility, technological advancements), it may not be suitable for complex or large-scale projects, as it could result in an overwhelming number of details and variables that are difficult to manage. Risk that the bottom-up theoretical model of the business fails to capture real-world nuances and therefore does not provide an appropriate benchmark.

Suitability for shortlisting: Low (not practical)

Applicability to:
OPEX
CAPEX
Commercial/non-regulated revenue

Overall viability for HAL

Unlikely to be appropriate in general, but could be applied to a subset of costs in a targeted way.

Overall viability for NERL

Whilst may be more viable than for HAL, still unlikely that a robust model of the business will be viable without considerable outlay of resources.

This option could be used with other options to fill any potential gaps.

B. Option 4: Top-down econometric benchmarking

Using econometric methods to estimate the underlying parameters of cost function models, allowing for a better understanding of the different cost drivers affecting companies and providing insights into their relative efficiency

Criteria	Explanation and RAG scoring against criteria	
Data availability	Some data are available (e.g., ATRS for HAL and the ACE benchmarking report for NERL), but their use is subject to the CAA determining the robustness and usability of these datasets for cost assessment purposes. For example, the ACE dataset comprises contributions from 38 ANSPs using common definitions and is publicly available, whereas the ATRS dataset includes a smaller sample of airports and is not publicly available. The CAA may also consider the possibility of creating its own dataset.	
Approach used by CAA	No.	
Regulatory precedent	Ofcom, Royal Mail. Applied a Stochastic Frontier Analysis to benchmark performance against Royal Mail's most efficient Delivery Offices or Mail Centres. [23] ORR, Network Rail. Benchmarking of total maintenance and renewal costs and of maintenance delivery units for the PR18. [24] Ofwat, PR24. Use of historical data and random effect to estimate opex, capital maintenance, and others. [25]	
Time/resource constraints	Can be time- and resource-intensive due to the complexity of data analysis, model development, computational requirements. But once data issues are resolved the methods can be relatively straightforward.	
Transparency	Models can be complex but usually show explicitly the relationship between costs and costs drivers.	
Proportionality	Likely to be proportional assuming that data can be made available with reasonable ease. It can provide valuable insights into the cost drivers.	
CAA's objectives other than cost	Potential to shed some light on other objectives. E.g. if model able to incorporate quality, it could provide useful information on the cost of quality improvements.	
Wider issues	Could be a powerful technique if the key challenge of comparability between companies is overcome. Data covering the Covid-19 period will create challenges to the analysis and might undermine conclusions.	

Suitability for shortlisting: High

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

Exploring top-down econometric benchmarking as a complement to the current approach is likely worth considering, if the necessary data is available. However, it is a time- and resource intensive exercise meaning that it may be more appropriate to consider this option for the long-term.

Overall viability for NERL

Exploring top-down econometric benchmarking could be worth considering. Identifying the output variables might be easier for NERL than for HAL. However, it is a time- and resource intensive exercise meaning that it may be more appropriate to consider this option for the long-term.

B. Option 5: International benchmarking

Comparing various aspects of operations (e.g. efficiency, unit costs, financial performance, charges) across a selection of comparator international entities

Criteria	Explanation and RAG scoring against criteria
Data availability	Data is available and some studies have been conducted. ATRS report, Jacob's report, ABG; KPMG report (airport operating cost efficiency benchmark report); ACE benchmarking and; CAA (Benchmarking of economic and financial metrics of HAL). The main question is how the CAA can make use of this information and whether it can have access to the required datasets.
Approach used by CAA	Partially. The CAA attempted to benchmark staff and pension costs against international ANSPs (e.g. German, French, Spanish ANSPs) (NR23). [26]
Regulatory precedent	ORR. Network Rail. Benchmarking operations and support costs against those of rail infrastructures in Europe for CP7. Has been dropped recently owing to data comparability issues. However, this situation was specific and unlikely to apply to HAL/NERL (e.g. costs rapidly doubled, meaning that comparators were no longer robust). ORR used bottom-up analysis to complement its analysis. [27] ORR, High Speed Rail. Analysis of international comparator project capital costs. [28]
Time/resource constraints	Gathering and analysing data from multiple entities in a manner that ensures comparability requires significant time and resources. This includes, e.g., accounting for differences between legal and regulatory environments, standardising data, and ensuring consistent variable definitions.
Transparency	Sensitive information might not be fully disclosed by the relevant entities. Definition of costs and revenues might be unclear, and metrics might not be comparable across different entities. Can require the use of complex statistical techniques, which may limit understanding and are more difficult to replicate.
Proportionality	If data issues mitigated, it can be a powerful tool for overcoming the asymmetry of information. However, if there are concerns about the accuracy of the results, the effort required might not be proportional.
CAA's objectives other than cost	N/A
Wider issues	Errors arise from the inability of models to normalise for the inherent differences between entities, data inconsistency and inaccuracy, and low statistical reliability.

Suitability for shortlisting: High

Applicability to:
OPEX
CAPEX
Commercial/non-regulated revenue

Overall viability for HAL

There is already some work on international benchmarking conducted by HAL that could be a starting point for further exploration (ABG and KPMG report).

Overall viability for NERL

Challenges in conducting comparisons, despite the existence of comparators in Europe (and potentially, US comparators). ACE benchmarking report could be and useful starting point. Steer does international benchmarking for unit costs.

Less likely to be viable for CAPEX (complex IT systems, uniqueness of capex programmes).

B. Option 6: Domestic/sector benchmarking

Comparing various aspects of operations across a selection of comparator domestic entities.

Criteria	Explanation and RAG scoring against criteria
Data availability	Data is more readily available in comparison to other options (e.g. ATRS report collects data for some UK airports such as MAN and LGW; CAA has already conducted domestic and sector benchmarking for some costs where it used data from ONS, OBR, BEIS, NERL annual financial and regulatory reports, NERL business plan, among others). However, it is uncertain whether there are strong comparators available in the UK for HAL/NERL.
Approach used by CAA	Partially. The CAA attempted to benchmark staff and pension costs against those of larger ANSPs (i.e. service providers at Gatwick, Edinburgh, Birmingham, and Highlands and Islands Airport). Other comparators such Thames Water, Royal Mail, Centrica, Network Rail, etc. were also assessed when looking at employer contribution rates. NR23. [29]
Regulatory precedent	Ofwat and Ofgem (historical domestic benchmarking of water and wastewater companies/ gas and electricity companies). ORR. Network Rail has attempted to benchmark its operations and support costs, such as signalling, train control, and information management, by engaging with non-rail organisations such as National Grid, and Anglia Water. However, most of them declined or were unable to participate, except for National Highways. PR23. [30]
Time/resource constraints	Significant time and resources needed to gather and analyse data from multiple entities but less demanding that international benchmarking.
Transparency	Factors like greater data homogeneity and regulatory consistency (when compared to international benchmarking) could increase transparency. However, transparency will ultimately depend on data quality and complexity of the methodology.
Proportionality	Domestic and sector comparisons are likely to yield meaningful and beneficial insights since the comparators are within the same jurisdiction. However, there are concerns about the comparators themselves and the cost drivers. Considering the scale of HAL and NERL, the effort required for such comparisons might not be proportional.
CAA's objectives other than cost	N/A
Wider issues	Errors arise from the inability of models to normalise for the inherent differences between entities, data inconsistency and inaccuracy, and low statistical reliability. May create incentives to entities to change the way they report data, once they understand the purpose for which data is being used.

Suitability for shortlisting: High

Applicability to:
OPEX
CAPEX
Commercial/non-regulated revenue

Overall viability for HAL

While it is a viable option for both capex and opex, finding robust comparators could prove difficult.

It may be worth considering whether MAN and LGW are suitable comparators. This involves assessing whether airports' metrics are comparable.

Overall viability for NERL

While it is a viable option for both capex and opex, finding robust comparators could be challenging.

It may be worth considering whether benchmarking subsets of services could be possible (e.g. against services provided at smaller airports).

B. Option 7: 'Within company' benchmarking

Comparing specific metrics, or performance indicators within a regulated entity, typically across different assets (e.g. terminals), divisions, or units. It can also involve benchmarking across repeated projects or historical data.

Criteria	Explanation and RAG scoring against criteria
Data availability	Data availability subject to criteria being met (e.g. units need to have decision autonomy; do the units compare comparable products, etc.). Currently unknown as to whether HAL and NERL record this data.
Approach used by CAA	Broadly no. However, CAA has attempted to compare capex programmes in a bottom-up way where maturity profiles are similar and data quality exists (H7).
Regulatory precedent	Ofcom, Royal Mail. Benchmarks performance against Royal Mail's most efficient Delivery Offices or Mail Centres. [31] ORR, Network Rail. Compares maintenance expenditure and conventional track renewals unit costs across Network rail's regions for CP7/PR23. [32]
Time/resource constraints	Depending on the data available, material time and resource may be required to normalise the indicators to ensure comparability across business units. However, this option presents fewer constraints than other benchmarking options that would require the construction and harmonisation of new data sets across multiple sectors/regulated entities across different jurisdictions (e.g. international or domestic benchmarking).
Transparency	High transparency as it involves internal data (regulated entities familiar with it). Methods used in this option are likely to be less complex than those used in others.
Proportionality	Can shed significant light on important aspects of cost assessment and less time and resource intensive than other options albeit the data may require additional work for the purpose of benchmarking.
CAA's objectives other than cost	N/A
Wider issues	Provides limited information on the efficient frontier (since even the most efficient 'units' within a company may not be as efficient as they could be). If based on historical benchmarking, entities can easily challenge this by arguing that conditions have changed significantly (e.g. drastic rise in input or technological advancements). Econometric methods likely to be needed to explain differences.

Suitability for shortlisting: High

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

There is no clear reason why within company benchmarking would not be a viable option, if the data is available and the criteria are met.

Comparing data across different business units, such as at the terminal level, may be challenging due to, e.g., variations in passenger mix and retail space.

Overall viability for NERL

It is unclear whether NERL's structure lends itself to this sort of approach. NERL has clarified that it only records unit costs for its long-term investment programme, with other costs being recorded in detail but on a functional basis rather than a 'unit' cost basis.

B. Option 8: Market testing and contestability

Requiring regulated entities to subject their capital programmes (and potentially other process) to competitive tenders and therefore, providing assurance around efficiency.

Criteria	Explanation and RAG scoring against criteria	
Data availability	Requires relatively little 'direct' data on costs since this approach is about eliciting cost savings through promoting competition in key parts of the supply chain.	
Approach used by CAA	No.	
Regulatory precedent	Ofwat. Introduced Direct Procurement for Customers (DPC) in PR19, which is a delivery model for large-scale enhancement projects with a whole-life totex of more than £100m, to competitively tender their design, build, financing, operation, and maintenance. This is still being used in PR24 where the default limit has been set at £200m. [33] ORR. Requires HS1 to periodically test the market for its M&R works through a competitive tendering process.	
Time/resource constraints	This is not immediately obvious as the time required may depend on the complexity of the cost in questions, especially in the case of capex where projects will vary significantly. Introduction of tendering processes can be costly and disruptive.	
Transparency	Promotes transparency by opening processes to competition and public scrutiny. Clear guidelines, open bidding processes, and transparent decision-making.	
Proportionality	Ultimately, it will depend on the scope and scale of the project (e.g. those with significant commercial components would benefit the most). May not be proportionate if other mechanisms can be used to test efficiency.	
CAA's objectives other than cost	Potential to shed some light on other objectives, in particular quality, range and availability (e.g. quality of services).	
Wider issues	Market testing is largely time consuming and would require the CAA to define and enforce the process. There may also be some risk to market testing projects that have a high level of complexity etc, with the potential outcome of no tenders bidding and thus no cost estimate.	

Suitability for shortlisting: High

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

There is no clear reason why market testing and contestability would not be a viable option for HAL, although regulatory precedent suggests it is not widely used and is likely most viable for capex.

Overall viability for NERL

There is no clear reason why market testing and contestability would not be a viable option for NERL, although regulatory precedent suggests it is not widely used and is likely most viable for capex.

An additional thought for NERL is that the capex framework is generally less developed than that of HAL's. Priorities may be to further develop a capex governance framework for example.

B. Option 9: Alternative considerations for 'frontier shift' and 'real price effect'

This could include options around estimating 'embodied' technical shifts (improvements in the design and quality of new versions of capital and intermediate products, which would not be captured in EU KLEMS TFP data used for frontier shift analysis).

Criteria	Explanation and RAG scoring against criteria	
Data availability	Data is generally widely available for conducting RPEs and frontier shift analysis e.g. EU KLEMs on Total Factor Productivity (TFP) and Producer Price Indices (PPIs) and bespoke series, although main discussion is around data selection, whether the indices available are representative and robust and timeframes of analysis.	
Approach used by CAA	Yes, the CAA assess RPEs and ongoing efficiency (i.e. frontier shift) for H7 but does not do a detailed assessment for NERL.	
Regulatory precedent	Ofwat. Conduct RPEs assessment of opex and frontier shift assessment of totex and botex for PR19. [34] ORR. RPEs assessment of Network Rails opex and renewals for CP7. [35] Ofgem. Conducts RPEs and ongoing efficiency assessment in RIIO-T2 and GD2 & RIIO-ED2. [36], [37] Ofcom. Undertook RPEs and frontier shift review as part of cost-based charge controls set for wholesale local access (WLA) market for the fixed connection used by broadband and fixed telephone services. [38]	
Time/resource constraints	There are little time and resource constraints.	
Transparency	Although methodologies for RPEs and frontier shift are set out clearly, it can be quite complex.	
Proportionality	RPEs and frontier shift assessment is proportionate in that it can lead to efficiency savings and push the regulated entity to be more efficient.	
CAA's objectives other than cost	N/A	
Wider issues	N/A	

Suitability for shortlisting: High

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

RPEs and frontier shift assessment are already conducted for HAL.

Overall viability for NERL

Detailed RPEs and frontier shift assessment have not been conducted for NERL, leaving scope to conduct a more detailed assessment.

B. Option 10: Business Plan Assessment

The main basis for CAA's current approach.

Criteria	Explanation and RAG scoring against criteria	
Data availability	Data is available in windows e.g. in the build-up and preparation of the next price control.	
Approach used by CAA	Current approach	
Regulatory precedent	Most regulators conduct business plan assessments as part of a broader set of cost assessment approaches, they use.	
Time/resource constraints	Can be time-consuming, but the necessary resources and knowledge are already available, and the process is familiar.	
Transparency	Level of transparency will mostly depend on the regulated entities preparing the business plan (e.g. HAL not shared its model with stakeholders). Clear documentation of process and findings enhances transparency.	
Proportionality	Proportional. This approach requires high level of scrutiny of the business plan, but the CAA already has a distinct process in place.	
CAA's objectives other than cost	N/A	
Wider issues	Relies on the level and quality of evidence provided by the regulated entity. Can miss the big picture and fail to spot opportunities for important changes or opportunities to become efficient.	

Suitability for shortlisting: Low (already adopted)

Applicability to:	
OPEX	
CAPEX	
Commercial/non-regulated revenue	

Overall viability for HAL

This option is already adopted for HAL.

This option rates 'Low' on suitability for shortlisting as the CAA already effectively uses this option. Any options that CAA decides to pursue will complement or add to this, rather than substituting it.

Overall viability for NERL

This option is already adopted for NERL.

This option rates 'Low' on suitability for shortlisting as the CAA already effectively uses this option. Any options that CAA decides to pursue will complement or add to this, rather than substituting it.

B. Option 11: Gap Analysis and Triangulation

This option does not centre on one method alone. Instead, it involves combining various cost assessment techniques to achieve a balanced view by comprehending the sources of differences using a structured framework.

Criteria	Explanation and RAG scoring against criteria
Data availability	As a minimum, it requires the data associated with the techniques being 'triangulated' and can often give rise to additional requirements as it raises additional questions/issues with those methods.
Approach used by CAA	Relative to other regulators, CAA has historically deployed relatively little triangulation and gap analysis – plenty of space for it to do so going forward.
Regulatory precedent	Ofwat, Ofgem and ORR have made extensive use of these methods. For example, specific studies have been commissioned focussing on reconciling results of different techniques.
Time/resource constraints	Typically, quite time and resource intensive as deep exploration of the techniques and results is often required. However, the 'payoff' can be significant in terms of providing assurance to stakeholders that conclusions are balanced and correct; uncovering sources of efficiency gain; defending against challenge; promoting transparency etc.
Transparency	In a sense, the very purpose of triangulation is promoting transparency: it is about exploring and explaining results in a way that goes beyond individual methods.
Proportionality	Can often be a valuable exercise that sheds significant light on important aspects of cost assessment. Particularly important if the CAA decides to use new approaches to complement its business plan assessment. However, it is typically resource intensive. Investment therefore needs to be carefully considered.
CAA's objectives other than cost	Often differences in costs between different entities can be explained by differences in other performance dimensions (e.g. performance, safety, volumes). Triangulation can shed light on the relationship between costs and other important variables.
Wider issues	N/A

Suitability for shortlisting: High

Applicability to:
OPEX
CAPEX
Commercial/non-regulated revenue

Overall viability for HAL

Feels plausible for HAL.

If the CAA chooses to complement its current approach with new methods, triangulating results might be useful, at least initially.

Overall viability for NERL

Feels plausible for NERL.

If the CAA decides to complement its current approach by adopting new approaches, triangulating results will be useful, at least initially.

B. Option 12: Business Plan Assessment with targeted bottom-up analysis

CAA's current approach, combined with targeted bottom-up analysis to supplement the assessment in areas of concern (where appropriate evidence is presented).

Criteria	Explanation and RAG scoring against criteria
Data availability	Data are available in windows, such as during the build-up and preparation for the next price control. Further data may be required to conduct a detailed analysis of specific aspects of the regulated business's activities. This approach relies heavily on strong evidence to justify further inspection of HAL and/or NERL's costs in a specific area, as it is resource-intensive.
Approach used by CAA	Business Plan Assessment is the current approach, but limited supplementary analysis has not been conducted.
Regulatory precedent	Most regulators conduct business plan assessments as part of a broader set of cost assessment approaches they use. Bottom-up analysis has been conducted in other sectors, including telecommunications.
Time/resource constraints	Can be time-consuming, but the necessary resources and knowledge are already available, and the process is familiar. Additional analysis is also likely to be very time-consuming and require significant resource, including co-ordination of experts.
Transparency	Level of transparency will mostly depend on the regulated entities preparing the business plan (e.g. HAL not shared its model with stakeholders). Clear documentation of process and findings enhances transparency. Supplementary analysis will address specific concerns, but models are necessarily complex and it is unclear how representative models will be.
Proportionality	Proportional; with the option of increased analysis whereby specific issues are of concern. However, investment in bottom-up analysis should be considered on the basis of necessity to ensure resources are appropriately allocated.
CAA's objectives other than cost	N/A
Wider issues	Relies on the level and quality of evidence provided by the regulated entity. Can miss the big picture and fail to spot opportunities for important changes or opportunities to become efficient. When supplementary bottom-up analysis is added, it may not be suitable for complex or large-scale projects, as it could result in an overwhelming amount of information. Bottom-up theoretical model may fail to capture real-world nuances and may fail to be an appropriate benchmark.

Suitability for shortlisting: High

Applicability to:
OPEX
CAPEX
Commercial/non-regulated revenue

Overall viability for HAL

This option is partially adopted for HAL, with potential to conduct focused deep-dives into areas of HAL's business plan where evidence suggests further efficiency or savings can be achieved

Overall viability for NERL

This option is partially adopted for NERI, with potential to conduct focused deep-dives into areas of NERL's business plan where evidence suggests further efficiency or savings can be achieved

C. More detailed roadmap considerations for shortlist options

C. Option 4: Top-down econometric benchmarking

Using econometric methods to estimate the underlying parameters of cost function models, allowing for a better understanding of the different cost drivers affecting companies and providing insights into their relative efficiency.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	Significant gains could be made in understanding costs further, which could enable a better grasp of cost drivers affecting regulated firms and providing insights into relative efficiency. This is particularly important for this approach because the scope of analysis is wide (all costs are covered).
How viable is the approach?	There is regulatory precedent for this approach, as seen with Ofwat, Ofgem and ORR. However, it requires available data and skilled resources to conduct econometric analysis and determining a set of comparators. Unlike Ofgem and Ofwat, there is no defined set of comparators for HAL and NERL; and selection of the comparator sample requires careful thought, particularly as comparators face different regulatory regimes and economic/geographic/political contexts which could result in different costs. If the CAA were to internally conduct this work, this would likely involve hiring 1+ full-time equivalents highly skilled in econometrics, particularly in benchmarking within regulated industries, and engaging with significant (likely several hundred thousand pounds per price control) consultancy resource. Existing data may lack the necessary granularity or be in a comparable format, necessitating the CAA to explore potential designs for a reporting structure or template. Additionally, with data covering the Covid-19 period, the approach may struggle to draw conclusions due to a lack of post-Covid-19 data.
What are the risks associated with the option?	While top-down econometric benchmarking has been employed in various regulatory settings, it demands substantial data, notably a thorough grasp of HAL and NERL's cost drivers, along with data spanning a considerable time frame. Major challenges may arise from the complexity of econometric modelling, potentially leading to difficulty in interpreting results, compounded by their potentially being little time to develop on these risk before the next price control. Additionally, choice of comparators is not well defined. Potential mitigation includes conducting stakeholder engagement throughout the process and engaging to ensure robust analysis. However, given regulatory precedent, it is likely that the CAA will need to own the models and ultimately make a decision of all the key modelling choices, e.g. comparators, techniques, cost drivers etc. This could give rise to increased regulatory scrutiny.

C. Option 4: Top-down econometric benchmarking (continued)

Practical consideration	Explanation	
What tools/techniques would be available to implement the option?	There is a set of more typical econometric benchmarking models that can be used, such as Ordinary Least Squares (OLS), Corrected OLS models (COLS), and Modified OLS models (MOLS). Additionally, regulators have employed alternative econometric methods such as Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA), although these methods are more complex and have been used where regulators have felt that they may add further statistical robustness.	
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	Key stakeholders would include HAL and NERL, who will play a significant role in this approach. The CAA will likely need to collaborate closely with both regulated entities to determine the optimal implementation of this approach, ensuring fairness and reasonableness, particularly given its application in an international benchmarking context. Customers will also need to be consulted with extensively.	
What are the key milestones for unlocking the option?	Significant forward planning is required to establish an agreed-upon procedure regarding the data to be used for comparison. This includes acquiring the necessary data, allocating sufficient internal resources to lead this task, engaging with consultants, and preparing budgets to conduct the exercise. It is essential to obtain sufficient data to perform econometric benchmarking effectively.	
What practical/implementation barriers are likely to be faced? How can they be overcome?	Budgetary preparation, Time constraints, resource availability and data constraints are likely to have a significant bearing over this analysis. These can be overcome with longer-term planning and investment in this benchmarking approach.	
What are the next steps to bridge the barrier if the options were to be considered?	Planning required for H8 and NR28, and identifying if relevant information is collected to conduct analysis at present. Identifying and addressing data gaps is necessary.	
When would the method be feasible to be implemented by?	Beyond H8 and NR28, considerable forward planning necessary.	
Applicability to HAL/NERL	Applicability for HAL: • Complex output variables make econometric benchmarking more difficult to interpret • Data may not be available with sufficient detail • KPMG dataset likely to be useful starting point (see findings)	Applicability for NERL: • Output variables simplistic, which could make econometric benchmarking more attractive

C. Option 5: International Benchmarking

Comparing various aspects of operations (e.g. efficiency, unit costs, financial performance, charges) across a selection of comparator international entities.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	This approach could potentially lead to the identification of significant cost savings, by identifying the 'frontier' of efficiency as it can (in principle) identify best practice from any comparators across the world. It could offer substantial gains in understanding and allows for a better comprehension of the cost drivers impacting regulated firms by providing insights into relative cost efficiency. Further benchmarking could enhance the understanding of cost drivers in more detail. The CAA attempted to employ this approach for NERL, focusing on areas such as staff and pension costs, and this approach could be extended to other areas as well.
How viable is the approach?	Performing international benchmarking with existing data sources is feasible. However, to ensure robust benchmarking, the analysis should carefully consider the comparator set. Sample selection requires careful thought, particularly as comparators face different regulatory regimes and economic/political/geographic contexts which could result in different costs. Nevertheless, there are costs associated with acquiring datasets, and significant resources would be required initially to process and understand these data sources to assess their comparability. Challenges with comparability may arise with this approach, including choice of sample for the comparison.
What are the risks associated with the option?	Errors may arise from inability of models to normalise for inherent differences between entities, data inconsistencies and inaccuracy, and relatively low statistical reliability. This is particularly prominent with international benchmarking as different accounting standards and requirements must be understood. Information asymmetry may reduce comparability and interpretation available. Given regulatory precedent, it is likely that the CAA will need to own the models and ultimately make a decision of all the key modelling choices, e.g. comparators, techniques, cost drivers etc.
What tools/techniques would be available to implement the option?	Similar to top-down econometric benchmarking, if econometric benchmarking is employed, the CAA could utilise a range of regression analysis methods such as OLS, COLS, and MOLS, along with alternative methods like DEA and SFA. If unit cost analysis is pursued (as assessed by the CAA's advisors in NR23), the key question will be to assess whether appropriate normalisers are used to produce unit cost estimates. This process may be less ambiguous for NERL than for HAL, given that staff costs are a significant driver of its cost base, with full-time equivalents serving as an intuitive normalising variable.

C. Option 5: International Benchmarking (continued)

Practical consideration	Explanation
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	International benchmarking may be of interest to other aviation regulators, regulated entities, HAL, and NERL. Involving these stakeholders would enhance regulatory transparency and could highlight significant opportunities for cost savings. An approach and suitable comparators would need to be agreed e.g. would it be appropriate to use publicly available data or would there need to be an internationally standardised data collection process.
What are the key milestones for unlocking the option?	Identifying and acquiring the required data, allocating sufficient resources, addressing information asymmetry to mitigate interpretation challenges, and seeking specialist advice, such as consultancy or advisory support, are crucial steps. Furthermore, analysing the available data and producing clear and concise results are essential. The CAA may also want to consider whether this approach could be immediately implemented in time for H8 & NR28, particularly applying international benchmarking to an econometric approach. Using the upcoming control period as a foundation to test how international comparison could be used, especially in NR28 where international comparison is already common, may be a good starting place. This also opens the discussion for how such an exercise would be done for HAL in H8.
What practical/implementation barriers are likely to be faced? How can they be overcome?	If information asymmetry cannot be addressed, limited insights may result. Overcoming this risk may involve investigating all available data or combining sources, along with using specialist resources such as consultants. However, this approach may require significant time, which may not be available before the next H7 review and could involve expensive consultations. Scrutiny of the approach is expected, given that cost drivers can vary depending on the assessed airport. Therefore, selecting an appropriate sample will be a crucial first step, alongside how the data will be gathered/the source of the data.
What are the next steps to bridge the barrier if the options were to be considered?	Identify and evaluate data sources, including assessing the cost of obtaining such data. A significant dataset like ATRS data could be used to gather information on other international airports. Studies such as KPMG's benchmarking report primarily uses publicly available information. The CAA will need to investigate data sources to determine the feasibility of conducting the analysis.
When would the method be feasible to be implemented by?	Beyond H8 and NR28, significant forward planning required.

C. Option 5: International Benchmarking (continued)

Practical consideration	Explanation	
Applicability to HAL/NERL	Applicability for HAL: • Significant potential to understand performance relative to the global frontier, and identify sources of efficiency • CAA does not have jurisdiction over international comparators, so choice of comparators is key • The CAA would also have to decide what the appropriate comparator selection i.e. sample would look like • Regulatory differences internationally can make comparisons more difficult • Data is available but expensive: Benchmarking Report — ATRS (atrsworld.org) • Overall, the HAL/KPMG dataset appears to be the natural starting point for further research	Applicability for NERL: • Significant potential to understand performance relative to the global frontier, and identify sources of efficiency • CAA does not have jurisdiction over international comparators, so choice of comparators is key • Regulatory differences internationally can make comparisons more difficult • Data is more readily available and there is precedent of the CAA using international unit cost analysis in NR23: ATM Cost Effectiveness Dashboard (eurocontrol.int)

C. Option 6: Domestic/sector benchmarking

Comparing various aspects of operations across a selection of comparator domestic entities.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	The CAA currently uses this approach to some extent. This approach could facilitate cost and information gains, but these depend on the availability of data.
How viable is the approach?	There is regulatory precedent for this approach, however Ofwat/Ofgem have considerably more regulatory power to obtain necessary data. It is uncertain if there is sufficient data available to use as comparators for HAL/NERL. Unless agreements can be made with other regulators, there is likely to be difficulty obtaining data. Even if data agreements are reached, differences in regulation can cause difficulty comparing across jurisdictions. If data is available, gathering of data requires analysing multiple sources and entities but is likely to be less demanding than international benchmarking.
What are the risks associated with the option?	This approach has been used in regulatory capacities, e.g. by Ofwat and Ofgem, however these regulatory bodies have significantly more power to require engagement with the regulatory body. Samples are likely to be small and suffer from selection bias if participation is optional.
What tools/techniques would be available to implement the option?	The CAA would likely be able to apply unit cost analysis as it has currently done, for NERL.
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	This may cause increased burden on regulated entities, as there is larger amounts of information required. This is exacerbated if firms do not collect the necessary data to participate.
What are the key milestones for unlocking the option?	Identify if regulatory framework allows for data collection, Identify key areas to benchmark (or if data is challenging, a subset of services), identify data requirements, design survey, carry out survey and analyse results. Exploring whether other regulators can reach data sharing agreements.

C. Option 6: Domestic/sector benchmarking (continued)

Practical consideration	Explanation	
What practical/implementation barriers are likely to be faced? How can they be overcome?	Appropriate robust comparators could be difficult to find. This could be mitigated by reaching data agreements with other regulators. Considering a subset of services to conduct domestic/sector benchmarking on could be possible to maximise possible gains.	
What are the next steps to bridge the barrier if the options were to be considered?	Identify areas that domestic/sector benchmarking could be most fruitful and identify data needed to proceed.	
When would the method be feasible to be implemented by?	H8 or NR28 review, or beyond if data is difficult to obtain.	
Applicability to HAL/NERL	Applicability for HAL: • Comparators are not easy to identify (CAA has potentially one or two comparators for HAL in the form of GAL and MAG) and this may lead to selection bias. • Comparators may be limited, given the size of HAL • Regulatory differences may make comparisons difficult	Applicability for NERL: • Data for comparators is, by construction, difficult. Direct comparators may not exist domestically, and alternative comparators must be considered • Subsets of services could be considered • Regulatory differences can make comparisons difficult

C. Option 7: 'Within company' benchmarking

Comparing specific metrics, or performance indicators within a regulated entity, typically across different assets (e.g. terminals), divisions, or units. It can also involve benchmarking across repeated projects or historical data.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	Within company benchmarking could shed light on important aspects of cost assessment and may be less resource intensive than alternative options and may provide useful insight into where cost savings can be made.
How viable is the approach?	Approach requires that units have decision autonomy, and that data is recorded by HAL and NERL. It appears that HAL and NERL do not currently record information at the level that would be useful.
What are the risks associated with the option?	Substantial time and resources may be required to establish a base for comparison across units. However, once set up, this would not demand significant resources. In addition to concerns about the independence of units, within-company benchmarking does not identify the efficiency of the 'frontier' company.
What tools/techniques would be available to implement the option?	If within-company benchmarking is to be used, it is likely that the CAA will have to determine Key Performance Indicators (KPIs) to which individual units can be compared with NERL & HAL (with this more applicable to HAL).
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	The CAA, HAL, and NERL. This entails using internal data, which regulated entities are likely familiar with. This method is likely simple for regulated entities to comprehend. Furthermore, it enhances regulatory transparency and, once established, reduces regulatory burden on regulated entities.
What are the key milestones for unlocking the option?	Identify and define units, ensure access to data, resources, and key assumptions are met for meaningful interpretation of analysis. Track unit analysis over time and establish a reporting process to which HAL and NERL would be able to report against.

C. Option 7: 'Within company' benchmarking (continued)

Practical consideration	Explanation	
What practical/implementation barriers are likely to be faced? How can they be overcome?	If units are not autonomous or rely significantly on other units, this analysis will not be useful. This barrier is difficult to address, if it exists, with this approach fundamentally underpinned by the autonomy of the units.	
What are the next steps to bridge the barrier if the options were to be considered?	Investigate possible units within company, and the likelihood of interactions between units. Assess whether the structure of the units and interdependencies may result in difficulty interpreting results and if this is a feasible approach, start to structure a report standard for how costs on these units will be assessed and compared.	
When would the method be feasible to be implemented by?	Unknown – HAL and NERL's company structure do not appear to readily lend themselves to this sort of analysis.	
Applicability to HAL/NERL	Applicability for HAL: • Units may not have decision making authority • Any inefficiencies should (in theory) already be eliminated through managerial activities/oversight	Applicability for NERL: • Unclear that company structure lends itself to this sort of approach

C. Option 8: Market testing and contestability

Requiring regulated entities to subject their capital programmes (and potentially other process) to competitive tenders and therefore, providing assurance around efficiency.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	This approach promotes competition in crucial parts of the supply chain, potentially resulting in cost savings due to increased competition. However, these savings may be marginal, particularly considering that the aviation sector in the UK, relative to other sectors such as water, does not typically involve capital expenditure projects as large (although this may change in future).
How viable is the approach?	There is some regulatory precedent, including Ofwat and ORR. However, the approach also requires regulated entities to outsource parts of the supply chain, which could introduce inefficiencies. Success in this regard would require periodic investigations to ensure sufficient competition is being induced.
What are the risks associated with the option?	The aviation industry may involve large-scale specialist projects, albeit fewer and less frequently than other sectors. There might not be enough suppliers available to fully capitalise on market testing and contestability. This method does not yield immediate results, and costs for complex projects can vary significantly. Implementing and maintaining the tendering process can be costly and disruptive. Moreover, there is no guarantee that firms will compete effectively, particularly for specialised projects requiring specialist knowledge.
What tools/techniques would be available to implement the option?	N/A
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	The engagement would likely involve consultation with HAL and NERL and understanding the proportion of projects likely to be within the remit of this option.
What are the key milestones for unlocking the option?	Deciding the scope and need for capital programmes, setting up a regulatory framework and a framework for intermittent review.

C. Option 8: Market testing and contestability (continued)

Practical consideration	Explanation	
What practical/implementation barriers are likely to be faced? How can they be overcome?	Likely to be significant set up costs. Stakeholder engagement to understand the type, cost and scale of capital programmes that may be eligible for competitive tenders would need to be conducted as a starting point.	
What are the next steps to bridge the barrier if the options were to be considered?	Assessing whether the costs of this option would be proportional to the added value it would provide to cost efficiency, both HAL and NERL. If the process is deemed viable, the CAA would need to engage with regulated entities to establish the parameters for engagement and identify the critical success factors for the framework.	
When would the method be feasible to be implemented by?	H8 or NR28, depending on the scale and quantity of capital projects.	
Applicability to HAL/NERL	Applicability for HAL: • Limited scale of capital projects • Specialist nature of projects means competition is likely to be limited	Applicability for NERL: • Limited scale of capital projects • Specialist nature of projects means competition is likely to be scarce • Generally limited capex and therefore relatively small scope

C. Option 11: Gap Analysis and Triangulation

This option does not centre on one method alone. Instead, it involves combining various cost Assessment techniques to achieve a balanced view by exploring the sources of differences using a structured framework.

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	There is significant space for gap analysis and triangulation as the CAA adopts a wider range of techniques (see findings). This could deliver significant benefits in terms of: 1. Increasing confidence and precision in the conclusions of cost assessment exercises 2. Reducing the risk of error (relative to using a single approach) 3. Enhancing the overall transparency of the CAA's cost assessment approach 4. Uncovering information about the sources of efficiency (not just the size of any possible efficiency gap)
How viable is the approach	The approach has significant regulatory precedent, and studies have previously been commissioned to reconcile results of different techniques. This could be particularly important in contentious regulatory cases.
What are the risks associated with the option	Gap analysis may not be proportionate in some regulatory contexts. Understanding why results differ may not shed light on which analysis is 'correct', and as such judgement may still need to be made.
What tools/techniques would be available to implement the option?	N/A
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	Regulated entities and their customers are likely to be important stakeholders, providing unique insight into what sources of differences etc.

C. Option 11: Gap Analysis and Triangulation (continued)

Practical consideration	Explanation	
What practical/implementation barriers are likely to be faced? How can they be overcome?	This analysis is not possible until after additional approaches have been adopted.	
What are the next steps to bridge the barrier if the options were to be considered?	Decide on a supplementary approach to existing approach, or alternative methodology (see findings). This option is likely to follow further analysis in the future and can aid regulatory transparency.	
When would the method be feasible to be implemented by?	H8 and NR28.	
Applicability to HAL/NERL	Applicability to HAL: • Aids regulatory transparency • Allows for variations in approach and understanding of differences in results	Applicability to NERL: • Aids regulatory transparency • Allows for variations in approach and understanding of differences in results

C. Option 12: Business Plan Assessment with targeted bottom-up analysis

CAA's current approach, combined with targeted bottom-up analysis to supplement the assessment in areas of concern (where appropriate evidence is presented).

Practical consideration	Explanation
How significant could the benefits of deploying the approach be?	The approach is already in use and provides an option for detailed analysis where the opportunity is largest. This allows for a proportional use of resources; and allocation of resources where they are most needed.
How viable is the approach	The approach is viable by construction: it is about only undertaking bottom-up analysis where the benefits of doing so clearly outweigh the costs.
What are the risks associated with the option	The risks of this option are limited.
What tools/techniques would be available to implement the option?	Various tools are available e.g. unit cost analysis; process benchmarking; and constructing a hypothetical efficient analysis of a specific cost areas using cost-build-up techniques based on expert judgement.
Who are the key stakeholders involved in implementing the option and what does the engagement look like?	Regulated companies and their customers. Their may be a particular role for customers in terms of identifying the areas of spend that are explored in most detail.
What are the key milestones for unlocking the option?	Identifying a threshold or conditions for when bottom-up analysis should be conducted. When the threshold is met, engage with appropriate experts and regulated entities to identify required data and perform required analysis.
What practical/implementation barriers are likely to be faced? How can they be overcome?	Determining which areas of the cost base are likely to benefit most from detailed bottom-up assessment is likely to be the most significant challenge. This could be overcome by introducing a clear process for making such a determination (see findings).

C. Option 12: Business Plan Assessment with targeted bottom-up analysis (continued)

Practical consideration	Explanation	
What are the next steps to bridge the barrier if the options were to be considered?	Defining criteria and process for determining which areas of costs are exposed to targeted bottom-up assessment.	
When would the method be feasible to be implemented by?	H8 and NR28, provided resource is available to outline when bottom-up analysis will be used.	
Applicability to HAL/NERL	Applicability to HAL: • HAL's structure is complex, and there could be multiple areas requiring targeted bottom-up analysis • A framework could be created to identify when targeted bottom-up analysis is used	Applicability to NERL: • Could be multiple areas requiring targeted bottom-up analysis • A framework could be created to identify where targeted bottom-up analysis is used

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