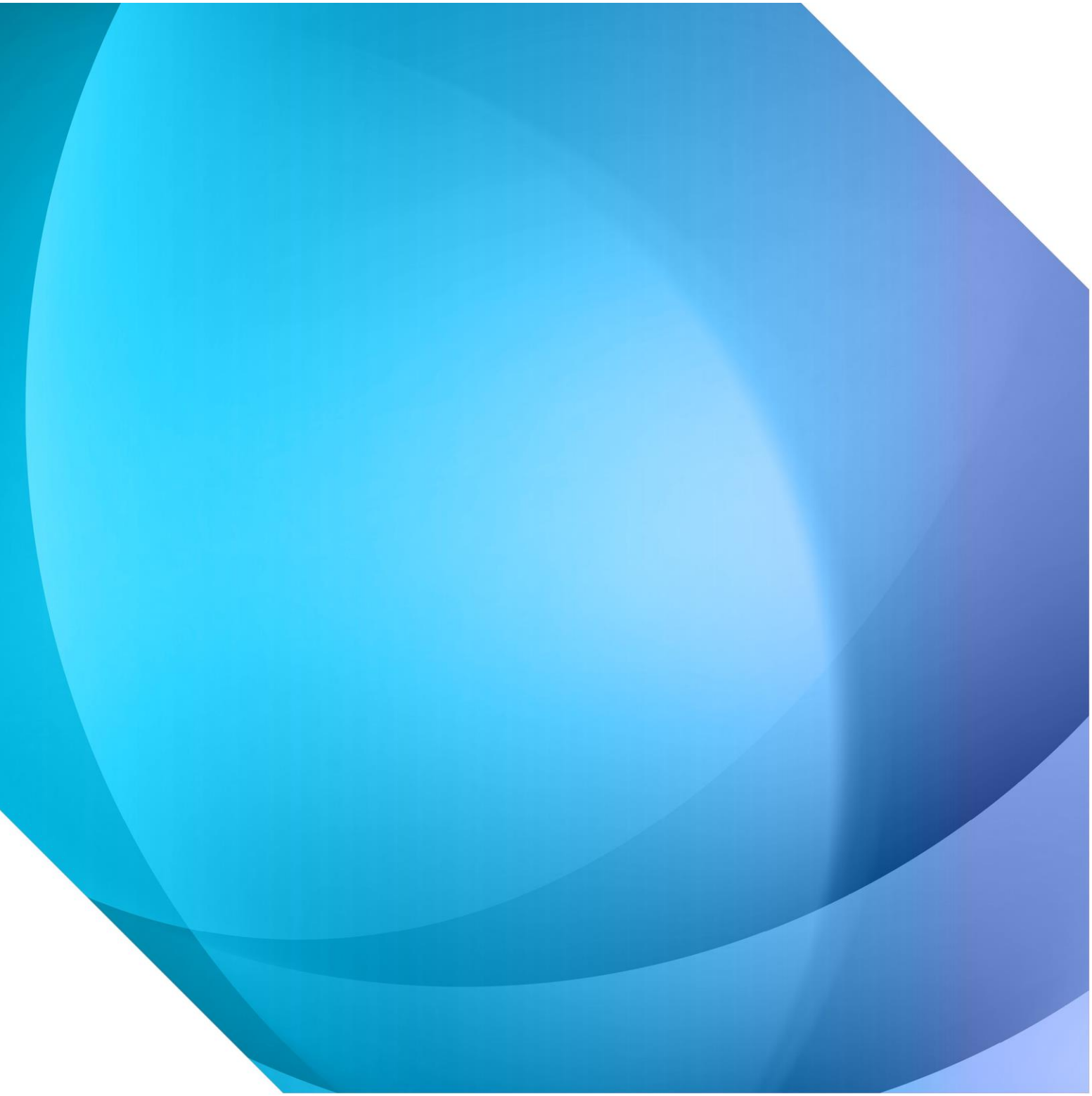
Consumer and Markets Group

Appendices to Draft UK Reference Period 3 Performance Plan proposals

For consultation

CAP 1758A



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Civil Aviation Authority
Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to: matt.claydon@caa.co.uk

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Appendix A

Abbreviations

Abbreviations	
3Di	metric that incorporates flight path inefficiencies
ACP	Airspace Change Proposals
ADS-B	automatic dependent surveillance – broadcast system
AIS	aeronautical information services
AMS	Airspace Modernisation Strategy
ANS	air navigation services
ANSL	Air Navigation Solutions Ltd
ANSP	air navigation services provider
ASEPS	advanced surveillance enhanced procedural separation
ASBU	Aviation System Block Upgrades
ATC	air traffic control
ATCO	air traffic control officer
ATS	air traffic services
ATSA	air traffic services assistant
ATFCM	air traffic flow and capacity management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
BAATL	Birmingham Airport Air Traffic Ltd
C1	key performance indicator in the area of capacity - average minutes of ATFM delay
C2	performance indicator in the area of capacity - average minutes of ATFM delay attributable to NERL
C3	performance indicator in the area of capacity - delay impact score
C4	performance indicator in the area of capacity - daily excess delay score
CAAPS	CAA Pension Fund
CAPM	capital asset pricing model
CCWG	Customer Consultation Working Group
CDO	Continuous Descent Operation
CEPA	Cambridge Economic Policy Associates
CNS	Communication Navigation Surveillance

Abbreviations	
CPI	consumer price index
CSU	chargeable service unit
DB	defined benefit
DC	defined contribution
DfT	Department of Transport
DMO	Delivery Monitoring and Oversight
DUC	determined unit cost
EoSM	Effectiveness of Safety Management
EU	European Union
FAB	Functional Airspace Block
FAS	Future Airspace Strategy
FIR	flight Information Region
FMARS	future military area radar service
FTE	full time equivalent
GAD	Government Actuary's Department
GANP	Global Air Navigation Plan
GDP	Gross Domestic Product
HAL	Heathrow Airport Limited
IAG	International Airlines Group
IBP	Initial Business Plan
ICAO	International Civil Aviation Organisation
IFR	instrument flight rules
IR	independent reviewer
KEA	horizontal en route flight efficiency of the actual trajectory indicator
KEP	horizontal en route flight efficiency of the last filed flight plan
KPA	key performance area
KPI	key performance indicator
LAMP	London Airspace Management Programme
MOCCA	Met Office Civil Contingencies Aircraft
LIBOR	London Inter Bank Offered Rate
MOD	Ministry of Defence
NATS	National Air Traffic Services
NATSPG	North Atlantic System Planning Group
NERL	NATS (En Route) plc

Abbreviations	
NM	Network Manager
NOP	Network Operations Plan
NPV	net present value
NSA	National Supervisory Authority
NSL	NATS Services Ltd
OEF	Oxford Economics forecast
OFF	Opex Flexibility Fund
OTS	organised track system
PBO	Pensions Benefit Obligation
PBN	Performance Based Navigation
PI	Performance Indicator
PRB	Performance Review Body
RAB	Regulatory Asset Base
RBP	Revised Business Plan
RFR	risk free rate
RPS	Regulatory Policy Statement
RP2	Reference Period 2
RP3	Reference Period 3
RP4	Reference Period 4
RORE	return on regulated equity
RPI	retail prices index
S&P	Standard & Poor’s
SARG	Safety and Airspace Regulation Group
SES	Single European Sky
SESAR	Single European Sky ATM Research
SIP	Service and Investment Plan
SSP	State Safety Programme
STATFOR	(Eurocontrol's) Statistics and Forecasts Service
TANS	terminal air navigation services
TMR	total market return
TSU	total service units

Abbreviations	
UIR	upper information region
UPR	user preferred routes
VAAC	Volcanic Ash Advisory Centre
WACC	weighted average cost of capital
WAFS	World Area Forecast System

Appendix B

Pensions

Introduction

B1 Pension costs (and in particular Defined Benefit or DB pension costs) represent a significant portion of NERL's staff costs (around 25% in RP3) and are a significant issue for all stakeholders.

B2 Pension costs include Defined Contribution, or DC, scheme employer contributions, DB scheme contributions, contributions to repair the DB scheme deficit and contributions to a pension cash alternative for members who opted out of the DB scheme

B3 The benefits for existing members in the DB scheme are subject to strong legal protections put in place at the time that NATS was transferred from 100% Government ownership to a Public Private Partnership. The restriction on the Scheme's amendment power broadly prevents an amendment being made to reduce or stop the future accrual of benefits in the Scheme for existing members and limits the scope for reducing benefits.

NERL's RP3 business plan

B4 For the DB scheme, NERL's projected contributions represent NERL's share of the NATS group scheme and reflect the outcome of the trustees' valuation as at 31 December 2017 (the 2017 valuation). UK legislation requires actuarial valuations of pension schemes to be made on the basis of prudent assumptions on a regular basis (usually every three years).

B5 The 2017 valuation reported a DB scheme deficit of £270 million at the end of 2017, a significant reduction in the £459m deficit reported following the 2015 valuation, driven by investment returns and demographic factors. This has enabled NERL and the pension fund trustees to reduce the required deficit repair payments per year. In NERL's RP3 business plan, deficit repair payments are forecast to end in 2023, with investment returns forecast to close the remaining deficit by the recovery end date of 2026. However, the reduction in real interest rates since the 2015 valuation increased the cost of future benefit accrual from 31.8% of pensionable pay at the 2015 valuation to 41.8% of pensionable pay.

B6 While there has been no change to benefits since RP2, NERL had previously taken steps to manage scheme costs by:

- closing the scheme to new entrants with effect from 31 March 2009;

- increasing benefits accrued after 31 October 2013 with respect to the Consumer Prices Index (CPI) rather than the Retail Prices Index (RPI). CPI is expected to increase by less than RPI on average over the long term;
- capping general pensionable pay increases to a maximum of CPI + 0.25% a year in the period 2013 to 2024; and
- requesting that trustees retain CPI as the basis of annual pay increase assumptions for the calculation of future liabilities, rather than CPI + 0.25% due to the trend in actual pay awards.

B7 NERL estimated that due to the 2013 changes in indexation and the pensionable pay cap, NERL avoided cost increases in RP2 of around £200 million.

B8 NERL has also introduced a pension cash alternative in lieu of employer pension contributions for staff opting out of the DB scheme. This pension cash alternative has a cost of 28.5% of pensionable payroll, compared with 41.8% for DB scheme members, which NERL estimates has saved around £10 million p.a. based on opt-outs at the end of 2017.

B9 Over the longer-term, NERL has set out that it is targeting funding the DB scheme on a long-term low-risk basis. If a surplus arises, NERL has stated that it will work with trustees to strike an appropriate balance between the opportunity to de-risk the scheme towards an appropriate long-term investment strategy and reducing the projected level of future pension contributions.

B10 Since the closure of the DB scheme in April 2009, new employees are on a DC scheme where NERL matches employee contributions on a 2:1 basis up to 18% of pensionable pay. During RP3, NERL forecasts an average cost of the DC scheme of 15% of pensionable pay based on actual costs incurred during RP2.

Government Actuary's Department review

B11 To support these draft proposals, we commissioned GAD to review certain aspects of NERL's pension arrangements.[1] This review focused on NERL's DB scheme benefits, investment strategy, funding valuation assumptions, projected pension contributions, and governance and expenses. GAD also carried out a high-level review of NERL's DC scheme against other UK pension schemes.

B12 In its review, GAD found that the NATS pension scheme benefits are more generous than those provided by typical UK private sector DB schemes, but there is limited scope to change the benefits due to protections in place under the scheme's Trust Deed and Rules, the 'Trust of a Promise' document and the 'Memorandum of Understanding'. GAD's approximate calculations suggest that if the NATS pension scheme benefits were to be more typical of UK schemes, all

[1] Government Actuary's Department, Analysis of pension costs for NATS (En Route) plc (September 2018).

else being equal the employer standard contribution rate could be around 30% of pensionable pay instead of the 41.8% assessed at the 2017 funding valuation. This would result in NERL's pension contributions being around £12 million lower per year during RP3 (in 2017 CPI prices).[2]

B13 On the 2017 valuation, GAD concluded that the assumptions are within a broadly reasonable range compared to wider practice given the investment strategy and assessed employer covenant strength. However, GAD said the CAA could consider whether the current level of prudence is optimal and aligns with an appropriate long-term strategy for the scheme.

B14 Looking to future valuations, GAD estimated that if neutral estimate investment returns are achieved on the scheme assets then a surplus is expected to emerge during 2022, though depending on scheme experience and market conditions, a surplus may emerge earlier or later than this. In the event of a surplus at a future valuation, GAD understood that priority might be given to de-risking the investment strategy if the trustees are supportive of this approach. De-risking the investment strategy should reduce the likelihood of materially higher deficit recovery payments being required in the future, though in the short to medium term it could lead to higher contributions and therefore costs to consumers if the discount rate is reduced as a consequence of the de-risking.

B15 GAD highlighted the following areas which the CAA may wish to consider within its assessment of pension costs:

- the extent to which benefits accrued before 31 October 2013 can be indexed with respect to CPI instead of RPI;
- the application of any future surplus within the scheme, whether used to de-risk the scheme or reduce future contributions;
- the mechanism for adjusting pension costs under the EU charging regulation 391/2013, which set out details of the pension cost pass-through;
- engaging with NERL on an appropriate long-term investment strategy;
- whether any actions can be taken in order to strengthen the trustees' assessment of the long-term employer covenant;
- whether the level of prudence in the valuation assumptions strikes the right balance between the interest of consumers and the long-term strategy of the scheme;
- that the regulated proportion of 76% (and the underlying salary projections) that informs the pension contribution projections in the initial business plan,

are correct and consistent with data and analysis supporting the wider price control review; and

- whether the administrative costs incurred represent value for money.

B16 We set out its initial views on these points below.

B17 In its RP3 business plan, NERL states that at this time the trustees do not believe it is appropriate to move away from RPI for past service indexation, but that the trustees would confirm this decision or otherwise following the Supreme Court's judgement for another scheme where the lawfulness of a change in indexation was being tested.

B18 We understand that this is a reference to the Supreme Court judgement in Barnado's (Appellant) v Buckinghamshire and others (Respondents), which was subsequently published in November 2018.[3] While we understand that the Supreme Court judgement found that the scheme drafting did not empower the trustees to select CPI as an alternative index to RPI for scheme benefits, the case appears to highlight that cases are very much to be judged on their own scheme drafting, rather than setting principles of general application. We note that the wording in the NATS Scheme rules around indexation is different, so from our initial review there does not appear to be a direct read-across to the indexation of benefits before 31 October 2013 in the NATS Scheme.

B19 We understand that a switch to CPI for past pensionable service may benefit customers through lower pension deficit payments, so is a potential area for NERL to reduce pension costs further. We also recognise that it is the responsibility of trustees and NERL to manage the NATS pension scheme effectively, including considering the implications from decisions around indexation for DB scheme members as well as customers. A stated above, we understand from NERL's RP3 business plan that trustees have not yet confirmed their decision on indexation.

B20 Bearing this in mind, we have not sought to reflect any potential change in indexation in these draft proposals for the RP3 pension costs. We will ask NERL to provide further information on the trustees' decision and evidence to demonstrate that NERL has worked with trustees to take actions to manage and mitigate the pension cost burden to customers, consistent with our guidance to NERL on preparing its business plan for RP3.

B21 Based on the GAD report, we understand that there is a reasonable likelihood of a surplus arising on the DB pension scheme during RP3. For example, the GAD report concludes that if neutral estimate investment returns are achieved on the

[3] The Supreme Court, Judgement on Barnardo's (Appellant) v Buckinghamshire and others (Respondents), Michaelman Term [2018] UKSC 55 (7 November 2018).

scheme assets then a surplus is expected to emerge during 2022. The likelihood of a surplus will also rise if future valuations reflect discount rates more towards the upper quartile or frontier of the Pension Regulator benchmarks in GAD's report, or if there is a change in the indexation of past service liabilities to CPI.

B22 We do not consider that NERL's RP3 business plan provides sufficient information on how the risk of trapped surplus and any associated high-cost de-risking would be managed in a way that is in the interest of consumers. In particular, GAD concluded that NERL and trustees appear to prefer to prioritise further de-risking, though it is not clear whether this has been informed by customer views given the potential implications for costs in the short, medium and longer term. NERL should further consider and engage on its longer-term strategy for pension costs to ensure the interests of consumers are appropriately considered.

B23 To reduce the risk of consumers unnecessarily funding a trapped surplus, our draft proposals remove the allowance for DB scheme deficit repair payments from 2022, which is the first year when we would expect deficit payments to be set based on the 2020 valuation. However, we understand that NERL will continue to have strong protections around pass-through of DB pension costs under the performance regulation. This means that any efficient DB deficit repair payments that are required from 2022 due to observed financial market conditions being worse than expected should be eligible for recovery.

B24 The performance regulation will retain the strong protections for the pension cost pass-through in RP2. This allows NERL to recover unforeseen and significant changes in pension costs resulting from unforeseen changes in national pensions law, pensions accounting law or financial market conditions. Changes in pension costs must be outside the control of NERL and NERL must have taken reasonable measures to manage cost increases.

B25 We have reflected these strong protections in making our judgements on NERL's cost of capital for NERL for RP3.

B26 We understand that NERL engages proactively with trustees on the longer-term strategy for pension costs. As set out above, we also consider that NERL should consider and engage more proactively with consumers on the longer-term strategy for pension costs, including the investment strategy, to ensure their interests are appropriately considered. We will consider this in any future assessment of the efficiency of pension costs.

B27 As part of its RP3 business plan, NERL proposed that we should provide a Regulatory Policy Statement (RPS) on pension costs to help improve the strength of the employer covenant and facilitate a lower pension cost for customers. These matters are discussed further in chapter 5 of the main document.

B28 Based on the GAD report, we understand that there may be opportunities for future DB pension scheme valuations to be based on a moderated (but still reasonable) level of prudence, which should properly reflect the strong regulatory protections around pension costs in the performance regulation.

B29 Our draft proposals are intended to provide additional challenge to NERL to identify ways to further mitigate DB pension costs ahead of the 2020 valuation, including considering the appropriate level of prudence.

B30 We have reviewed staff costs and pension costs as part of these RP3 draft proposals. We have not identified any concerns with NERL's allocation of pension costs.

B31 We recognise that management of the NATS Scheme and administration costs are the responsibility of trustees. We would welcome further evidence to support its administrative costs in response to GAD's findings.

CAA's draft proposals for pension costs in RP3

B32 As set out in chapter 5, we have proposed a reduction in the DB deficit repair costs by £36 million over RP3, as well as a further reduction in ongoing DB and DC pension costs by £12 million in RP3 as a result of wider assumptions on operating costs efficiencies. There is also a minor change from our revised assumptions for CPI inflation. Our projections of pension costs are summarised in the table below.

Table B.1 – CAA's draft proposal for en-route pension costs (£m, 2017 CPI prices)

	2020	2021	2022	2023	2024	RP3 total
NERL's RP3 business plan	**89.2**	**88.5**	**87.3**	**85.3**	**65.6**	**415.8**
Defined benefit pension	62.3	61.2	60.0	58.2	38.7	280.6
Defined contribution pension	10.9	12.1	13.1	13.8	14.8	64.7
Pension cash alternative	15.9	15.1	14.2	13.2	12.1	70.5
CAA's draft proposals	**88.1**	**86.7**	**67.0**	**64.3**	**62.1**	**368.2**
Defined benefit pension	61.7	60.1	40.7	38.4	36.7	237.6
Defined contribution pension	10.8	11.8	12.6	13.2	14.0	62.4
Pension cash alternative	15.7	14.7	13.7	12.6	11.4	68.2
Difference	**-1.1**	**-1.8**	**-20.3**	**-21.0**	**-3.5**	**-47.6**
Defined benefit pension	-0.7	-1.1	-19.3	-19.8	-2.1	-42.9
Defined contribution pension	-0.2	-0.3	-0.5	-0.6	-0.8	-2.4
Pension cash alternative	-0.2	-0.4	-0.5	-0.6	-0.6	-2.3

Source: CAA analysis of NERL's RP3 business plan

Appendix C

Financeability

Introduction

C1 The CAA has a statutory duty under Transport Act 2000 to ensure that NERL will not find it unduly difficult to finance its licensed activities. NERL's licence also includes a requirement for NERL to use all reasonable endeavours to ensure that it maintains at all times an investment grade issuer credit rating.

C2 In addition, NERL's licence includes a gearing cap of 65%. That is, if gearing exceeds 65% it would be prohibited from paying dividends or making any cash payments to affiliates except if these satisfy specific criteria.

C3 Our business plan guidance asked NERL to provide evidence that its business plan (including both in respect core and wider requirements) is financeable using a broad interpretation of financeability that looks beyond simple credit metrics and acknowledges the wider context of agencies' rating assessments. In particular, rating agency methods draw from a broad consideration of the operating and risk environment a company operates and finances in, not just the credit metrics.

C4 NERL and its existing bonds are rated by Moody's and Standard & Poor's (S&P) credit rating agencies. In their latest credit reports, both Moody's and S&P assigned NERL a relatively strong investment grade rating of A2 and A+ respectively.[4] This reflects NERL's strong financial performance due to strong and stable cash generation, relatively low debt level and traffic incentive that limits downsides in revenue. It also includes one notch uplift due to likelihood of extraordinary government support.

NERL's RP3 business plan

C5 In its RP3 business plan, NERL set a target credit rating in the range of A2/A to A3/A-. This is a strong investment grade credit rating that is consistent with NERL's current rating from Moody's and is one notch below NERL's current credit rating from S&P. NERL considers that a higher target credit rating would not be in the interest of customers (given the potential costs involved which it

[4] Moody's, NATS (En Route) plc Credit Opinion (November 2017); and S&P Global Ratings, NATS (En Route) plc (December 2017).

would seek to recover from its customers) and that a lower credit rating would be inconsistent with the gearing "target"[5] and cap in NERL's licence.

C6 Based on its interpretation of published guidance from Moody's and S&P NERL has suggested that for:

- Moody's: an adjusted net debt / RAB ratio above 70% would indicate a possible downgrade and a ratio below 60% would indicate a possible upgrade; and
- S&P: a ratio of funds from operations (FFO) to S&P adjusted net debt of below 18% would indicate a possible downgrade.

C7 NERL has also reviewed the RP3 business plan against other credit metrics (adjusted interest cover and FFO to net interest payable), its own financial covenants and return on regulatory equity (RORE).

C8 NERL has modelled upside and downside scenarios against a number of traffic, cost, incentive and macroeconomic factors using Monte Carlo simulations, and considered qualitative factors such as NERL's licence, Brexit and NERL's regulatory framework. NERL assesses that its business plan is financeable.

CAA's approach to assessing financeability

C9 We have assessed the financeability of these draft proposals in line with our duties and NERL's licence requirements. Our financeability assessment takes account of our proposals for changes to the forecasts in NERL's RP3 business plan for operating costs, traffic, non-regulatory income and allowed return.

C10 We consider that NERL's high-level approach to assessing financeability is broadly appropriate, using a combination of quantitative factors and qualitative factors. We have assessed financeability of these draft proposals for the same credit metrics and financial covenants as NERL and has focused on the core Moody's and S&P metrics for downside stress testing. We have also considered relevant qualitative factors around NERL's operating and risk environment.

C11 We have assessed these draft proposals against NERL's target credit rating based on the notionally financed company, consistent with our views of efficient financing arrangements and an efficient cost of capital. It is NERL's management's responsibility to ensure that it maintains an investment grade credit rating. NERL also has an important role in being efficient and responding effectively to downside scenarios. Our stress tests are before any significant mitigating actions by NERL's management. This could involve strengthening its

[5] We note, however, that it does not set a particular target level of gearing for NERL to meet and that its financial structure is a matter for NERL's management.

cash position by reducing dividends and/or taking other actions so that its long-term business prospects would remain strong.

C12 To assess the financeability of the notional company in NERL's financial model, we made the following adjustments to the financing and inflation assumptions in NERL's business plan:

- to model the notional financing structure with a gearing around 60% during RP3 and RP4 under our draft proposals, we set a special one-off dividend in 2019, used current levels of NERL's dividends in RP3 and a lower level of dividends in RP4 based on allowed cost of equity (5.13%);
- we set the costs of new debt during RP3 to be consistent with the cost of new debt in our proposed WACC (0.1% in RPI-deflated terms, 3.1% in nominal terms); and
- we updated the forecasts for CPI and RPI inflation during RP3 to reflect more recent forecasts published by the International Monetary Fund (IMF), cross-checked with forecasts published by HM Treasury and the Bank of England.

Approach to stress tests

C13 We have adopted a more focused approach to stress-testing rather than repeating NERL's Monte Carlo analysis.

C14 We identified two key business risk drivers: traffic and operating costs (excluding pension costs). These reflect that the key demand driver for NERL is air traffic and operating costs are the largest price control building block making up more than 60% of determined costs. In addition, the regulatory framework provides strong protection against other key external risk factors, such as pension cost pass-through and that efficient capital expenditure is added to NERL's RAB.

C15 We have modelled two stress tests for traffic and costs, based on a range of historical and forecast information available from NERL and STATFOR. These are summarised below, with further details on how these have been selected in chapter 7 of the main document. We consider these represent plausible but relatively unlikely downside scenarios, particularly given we assume they are sustained over the whole of RP3.

- Stress test 1: 10% reduction in actual traffic compared to our central assumption in all years of RP3.
- Stress test 2: 5% reduction in actual traffic and 2.5% increase in actual staff and non-staff operating costs compared to our central assumption in all years of RP3.

C16 For each of these stress tests, we reduced NERL's forecasts of dividends in RP3 to be consistent with our assumptions for the cost of equity in the WACC (5.13%

in post-tax RPI-deflated terms). In practice we would expect NERL to be able to take stronger mitigating actions, if necessary suspending dividends and making offsetting efficiency gains.

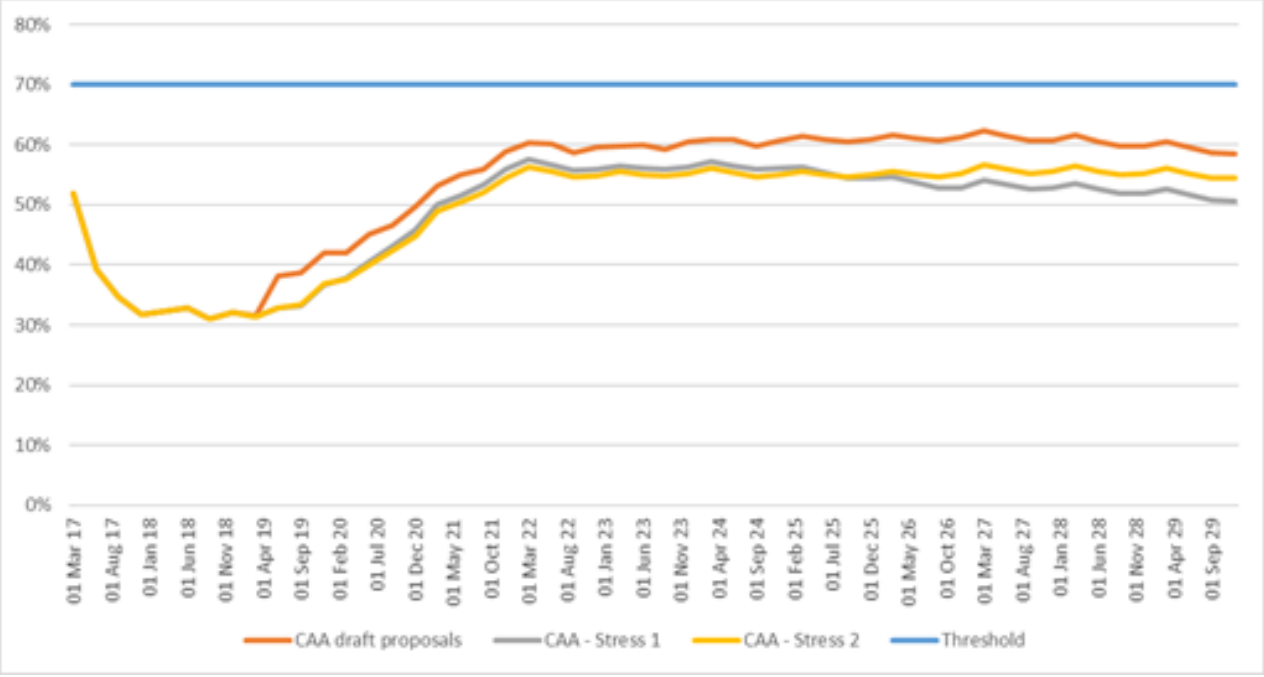
CAA's assessment of financeability

Quantitative factors

C17 In its credit analysis on NERL in November 2017, Moody's stated that: *"downward pressure on the rating could develop if NERL's financial profile were to materially deteriorate, such that Moody's adjusted Net Debt/RAB was to increase above 70%"*.[6]

C18 Figure C.1 below shows that adjusted Net Debt/RAB is expected to increase substantially in RP3, particularly reflecting our assumption that NERL will be raising a significant amount of debt during RP3. However, there remains substantial headroom to the 70% threshold for a downgrade under our draft proposals and stress tests, based on our dividend assumptions. Under the stress tests, we have reduced NERL's dividends based on the allowed cost of equity, though in practice we might expect further significant management action in response to worsening traffic, cost levels and/or other factors.

Figure C.1 – Assessment of adjusted net debt to RAB



Source: CAA analysis

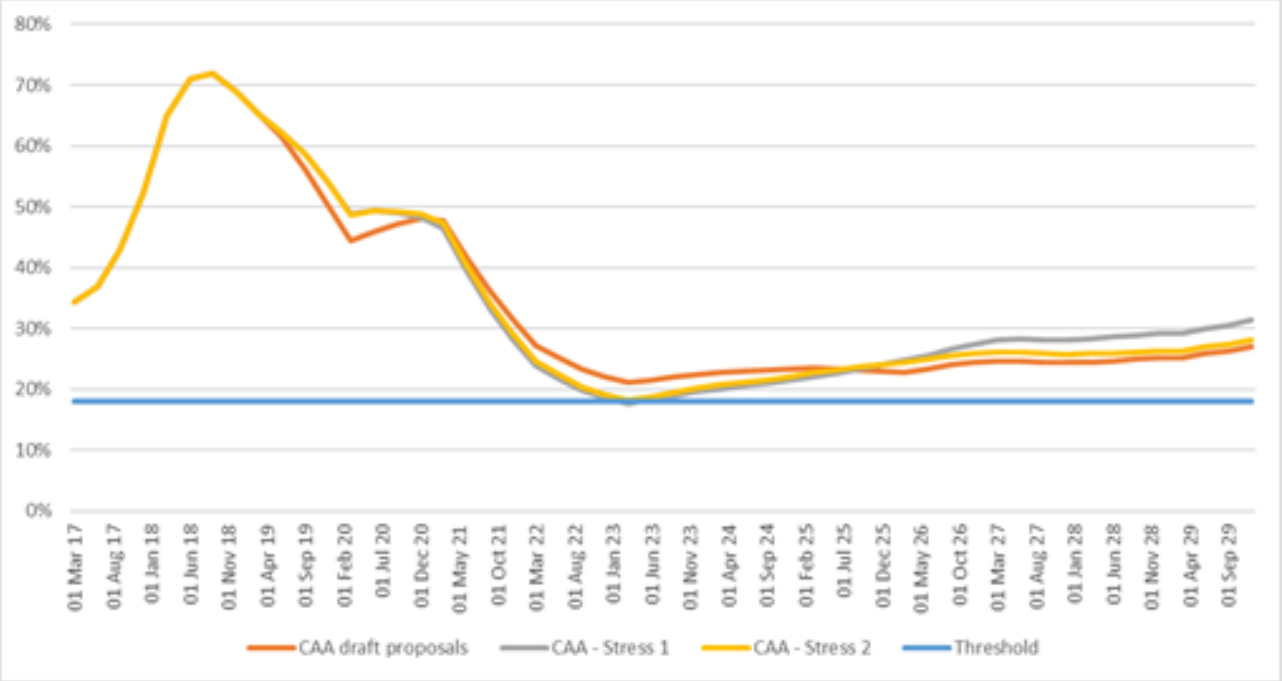
[6] Moody's, NATS (En Route) plc Credit Opinion (November 2017).

C19 In its credit analysis for NERL in December 2017, S&P set out that it could lower NERL's rating if funds from operations (FFO) to debt falls below 18%.[7] This ratio has been estimated from our assumptions about NERL's EBITDA relative to its net debt, adjusted for pension deficits and lease costs.

C20 Figure C.2 indicates that FFO to adjusted net debt is expected to decline in RP3, due to increases in debt and reductions in expected revenues, including from our assumptions for a lower cost of capital and pension deficit payments. While there is a decline in this ratio in our draft proposals, we note that there remains reasonable headroom above the 18% threshold over RP3. Our stress tests, with significantly lower outturn traffic and higher outturn costs than forecast during RP3, do reach this threshold for a few quarters in 2023, before recovering during the rest of RP3 and RP4. Therefore, the longer-term trend, even under the stress tests, is for FFO to net debt to remain above 18%.

C21 As noted above in our downside stress tests, we have not modelled the further mitigations available to NERL. We consider that these downside stress tests would prompt significant management action to avoid the risk of a downgrade, such as reducing dividends. We therefore consider it is unlikely that the FFO to net debt would fall below 18% during RP3 for a sustained period.

Figure C.2 – Assessment of FFO to adjusted net debt



Source: CAA analysis

[7] S&P Global Ratings, NATS (En Route) plc (December 2017).

C22 Table C.1 below shows the results under our draft proposals for the core metrics above, as well as two other credit metrics presented in NERL's RP3 business plan based on previous Moody's guidance (adjusted interest cover ratio and FFO to net interest payable), as well as NERL's financial covenants.

C23 On FFO to Net Interest Payable and Adjusted Interest Cover, NERL mentions that Moody's no longer publishes guidance on these thresholds, but that in previous guidance these were, respectively, 5.5x and 2.2x for A2, and 4.5x and 1.8x for A3.[8] These are similar ratios and it is unclear what weight, if any investors and credit rating agencies will place on these ratios, particularly given the headroom to Moody's and S&P's core ratios and the other qualitative factors discussed below. On this basis, we consider in the round that the credit metrics appear to be consistent with NERL maintaining a strong investment grade credit rating.

C24 For NERL's financial covenants, our draft proposals remain above the 'trigger levels' during RP3. In the stress test where traffic is 10% lower than the baseline, we note there is pressure towards the beginning of RP3. The cash position then recovers as mechanisms such as traffic risk-sharing mitigate this risk with a 2-year time lag. The overall trend appears reasonable, but there may be pressures on operating cash flows early in RP3 if traffic is very significantly lower than forecast in these years. We would expect NERL to be able to mitigate these risks, at least to some extent, by taking significant management action, such as reducing dividends, identifying cost reductions, and managing debt costs and liquidity reserves. Given this is not a sustained issue during RP3 and the potential mitigations available, we consider it highly unlikely that NERL would breach the financial covenant trigger levels under the downside scenarios.

Table C.1 – Assessment of credit metrics under CAA's draft proposals

		Unit	Threshold/ Trigger	2020	2021	2022	2023	2024
Credit metrics	Adj. Net Debt to RAB	%	<70%	46%	56%	60%	60%	61%
	Adj. FFO to Net Debt	%	>18%	46%	39%	24%	22%	23%
	Adj. FFO to Net interest	Ratio	Not in guidance	10.3x	10.1x	7.2x	6.7x	6.8x
	Adj. Interest Cover	Ratio	Not in guidance	1.8x	2.8x	1.6x	1.3x	1.2x

Source: CAA analysis

Note: Annual values are an average of quarterly results

[8] These ratios both measure the ability of NERL to repay its debt costs, though the Adjusted Interest Cover is significantly lower than FFO to Net interest payable as it is assumed that FFO for the is reduced for regulatory depreciation and depreciation of lease costs.

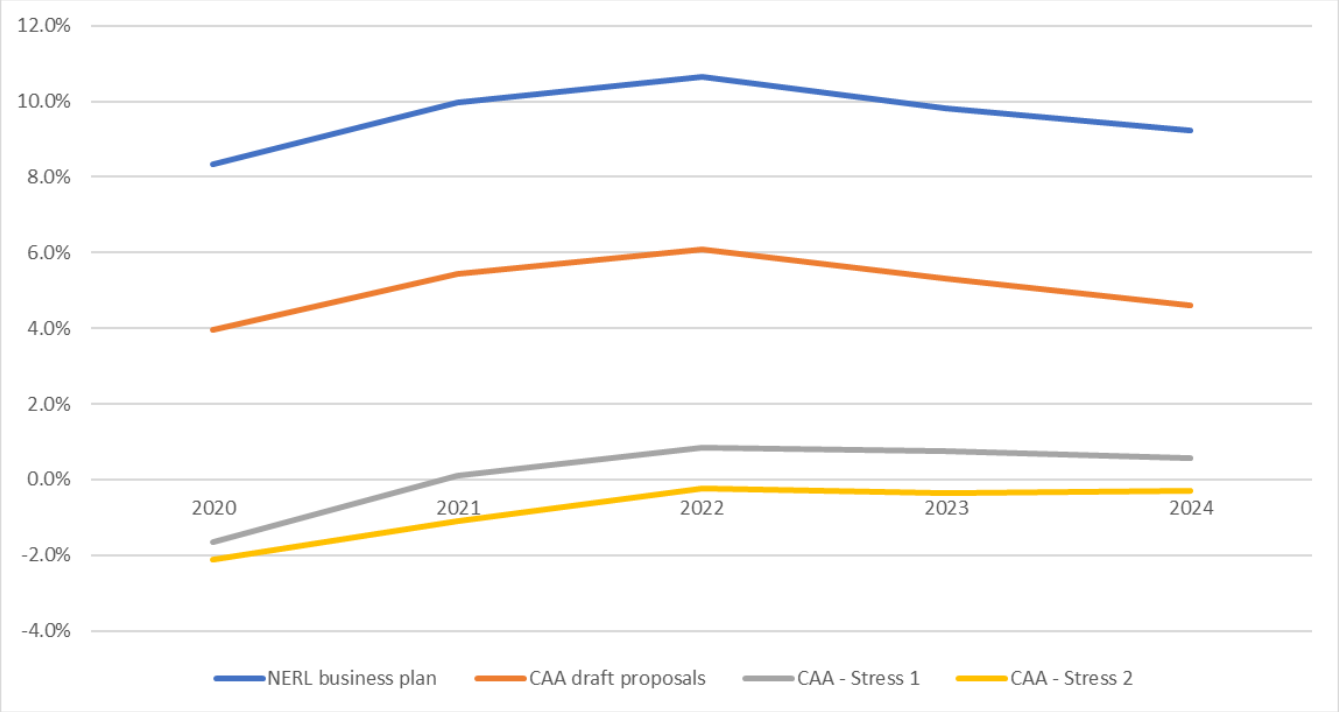
C25 Figure C.3 below shows the return on regulatory equity (RORE) under our performance plan and stress tests. The RORE is a measure of the expected return on the portion of the RAB financed by equity and gives an indication of financeability from an equity perspective.

C26 In our draft proposals, RORE is in line with our allowed cost of equity of 5.13% over RP3, with some variation between years. In our stress tests, RORE reduces to close to zero or negative. This reflects the relatively high sensitivity of RORE to the changes in regulatory returns from lower traffic and higher costs, given the relatively small size of NERL's RAB (and hence notional portion financed by equity) to operating expenditure, compared with other regulated companies. It is also consistent with a company making lower returns in more challenging times, as returns in line with the cost of capital should be earned rather than guaranteed. Given the focus on stress-testing for credit metrics, we have not shown equivalent upside scenarios, though these could lead to RORE that is significantly higher and potentially above 10% in real-RPI-deflated terms. We also note that returns to equity holders are within management control and could be improved through effective management of costs and performance against financial incentives.

C27 An important factor in determining that equity is financeable is setting an allowed weighted average cost of capital and cost of equity that provides appropriate compensation for the risks faced by equity investors. The calculation of the allowed cost of equity is discussed in Appendix D. We have considered a broad range of evidence to estimate the appropriate cost of equity for RP3 from our advisors, information submitted by NERL to support its business plan, and from a review of recent regulatory precedent and other cross-checks.

C28 Based on this, we consider that our draft proposals appear to be financeable from an equity perspective.

Figure C.3 – Return on regulatory equity (RORE)



Source: CAA analysis

Qualitative factors

C29 In addition to the quantitative factors from credit metrics and financial covenants, we also considered a range of different qualitative risk factors that could affect NERL's financeability. We note that both Moody's and S&P places significant weight on qualitative factors, in addition to credit metrics, in assessing NERL's financeability. Both S&P and Moody's assess NERL as having a strong position underpinned by its monopoly position resulting in stable cash flow generation, with a well-established and transparent regulatory regime. Both rating agencies mention the uncertainty regarding the SES performance scheme framework under Brexit.

C30 One of the key areas is the nature and stability of NERL's regulatory framework which is closely interlinked with SES performance framework. In its RP3 business plan, NERL considered that substantial changes to the regulatory mechanisms such as pensions pass-through, could put pressure on its existing credit rating.

C31 The majority of the risks highlighted by NERL have been addressed in these draft proposals and/or are dealt with SES performance scheme. These

mitigations should enable NERL to maintain its current strong position on business risks that supports its investment grade credit rating. In particular:

- the pensions cost pass-through mechanism will remain in RP3 under the performance regulation;
- we have proposed that the traffic sharing mechanism will remain the same as it was in RP2, consistent with the default mechanism under the performance regulation. This mechanism provides significant downside protection to revenue in the event of lower than expected traffic. We note that any significant reduction in traffic arising from a hard Brexit may fall in RP2, when NERL has an even stronger financial position than forecast in RP3. This is supported by recent findings from S&P that NERL would likely maintain strong liquidity under all no-deal Brexit stress tests;[9] and
- the performance framework also provides strong protections against unexpected changes in requirements requiring more efficient capital expenditure, as well as other factors such as unexpected changes in inflation, financing costs, taxation or other legal changes. Our approach and proposals are based on the SES performance framework applying to the UK on the 1 January 2020. If no future EU-UK arrangements are put in place before the end of 2019, the economic regulation of NERL will default to the Transport Act. We note that under both the EU and domestic regulatory frameworks the substantive requirements are similar – we expect to produce a price control and service quality targets that go towards achieving the strategic outcomes established in CAP 1511,[10] and these need to be in place by 1 January 2020.

Overall assessment

C32 Based on our assessment of quantitative and qualitative factors above, we consider in the round that our draft proposals are consistent with NERL maintaining a solid investment grade credit rating and does not cause undue financeability concerns even under our downside stress test scenarios.

C33 Although there may be a risk in some downside circumstances that NERL does not maintain its current strong rating, we note that NERL should be able to maintain an investment grade credit rating. In such adverse circumstances we would expect significant management action by NERL beyond that we have tested to maintain a strong financeable position for debt and equity holders. We would expect that like any prudent business, NERL would consider potential

[9] S&P Global Ratings, Countdown to Brexit: Just 100 days left to find a firm foundation for the transportation infrastructure sector (December 2018).

[10] CAP 1511 - Strategic outcomes for the economic regulation of NERL 2020-2024: discussion document (April 2017).

challenges it could face, and have plans about the interventions it could make to respond to such challenges.

Appendix D

Cost of capital

Introduction

D1 In its RP3 business plan, NERL proposed a pre-tax weighted average cost of capital (WACC) of 5.07%, deflated by the retail prices index (RPI) for the UK en route and Oceanic price controls.[11] This is made up of a vanilla WACC of 4.51% and a tax uplift of 12.7%.[12] NERL's proposed vanilla WACC is higher than the we set at RP2 (4.25%), but the pre-tax WACC is lower than at RP2 (5.86%) given the reduction in the corporation tax uplift (37%).

D2 NERL commissioned NERA Economic Consulting to advise on the appropriate WACC for RP3. NERA's report sets out a low-high range and point estimate for the vanilla WACC and was published alongside NERL's RP3 business plan.[13] NERL adopted NERA's point estimate, which reflected the mid-point of the low-high range.

D3 In this appendix, we set out our approach to estimating NERL's pre-tax WACC We have consulted a wide range of market, regulatory and academic sources to inform these draft proposals, including the following:

- We commissioned Europe Economics to provide advice on areas of the WACC specific to NERL – betas, gearing and cost of new debt. Europe Economics' report is published alongside these draft proposals.[14]
- We has also published a report from PwC, which updates its WACC analysis published in December 2017 for CAA.[15] PwC's report is on WACC for Heathrow Airport Limited for the next price control (H7), though we have considered the recommendations on the market-wide factors – total market return and risk-free rate – in determining NERL's RP3 WACC. For the avoidance of doubt, the draft proposals in this appendix are specific to NERL

[11] This is consistent with the Regulatory Asset Base (RAB), which is inflated each year to current cost terms using RPI.

[12] The 'vanilla' WACC uses a pre-tax cost of debt and post-tax cost of equity. The pre-tax WACC includes a tax uplift to the cost of equity, which provides a tax allowance for NERL. Other UK regulators typically use a vanilla WACC to determine an allowed return on the regulatory asset base and then make a separate allowance for corporation tax.

[13] NERA, Updated Weighted Average Cost of Capital for NATS (En-Route) plc at RP3 (September 2018).

[14] Europe Economics, Components of the Cost of Capital for NERL (December 2018).

[15] PwC, Estimating the cost of capital for H7 – Response to stakeholder views (January 2019).

for RP3 and should not be read as a CAA position for H7. We set out further details on the links between the WACC in RP3 and H7 in a separate working paper.[16]

- We have also considered a report from Cambridge Economic Policy Associates (CEPA) for the International Airlines Group (IAG).[17] This report and NERL's response[18] are published alongside these draft proposals.
- We have reviewed recent consultations and determinations from other UK regulators – Ofwat, Ofcom and Ofgem – and the Competition and Markets Authority (CMA).
- We reviewed recent academic reports, including the cost of equity study by Professor Wright *et al* for the UK Regulators Network (we refer to this report as the UKRN cost of equity report).[19]

D4 The rest of this appendix provides further details on the CAA's approach to estimating the cost of capital for NERL. This appendix is structured by topic as follows:

- CAA's overall approach to estimating the cost of capital;
- inflation;
- total market return;
- risk-free rate;
- gearing;
- overall cost of equity;
- cost and proportion of embedded debt;
- cost of new debt;
- overall cost of debt;
- tax uplift; and
- overall weighted average cost of capital.

[16] Published at www.caa.co.uk/natslicence.

[17] CEPA, Cost of capital for NATS (En-Route) plc (November 2018).

[18] NERL, NERL response to CEPA's 'Cost of capital for NATS (En-Route) plc' report for the International Airlines Group (December 2018).

[19] Professor Stephen Wright et al, Estimating the cost of capital for implementation of price controls by UK Regulators, An update on Mason, Miles and Wright (2003) (March 2018).

D5 Unless otherwise stated, the figures in this appendix are presented in RPI-deflated terms, consistent with indexation of the regulatory asset base (RAB). The difference between the consumer prices index (CPI) and RPI forecasts shown in this appendix, are used to express the allowed WACC components in nominal and CPI-deflated terms for comparison where relevant.

CAA's views on cost of capital for RP3

Overall approach

D6 Our business plan guidance for NERL set out that NERL should assume a cost of capital that is *"no more than the efficient level necessary to compensate NERL for the business and regulatory risks it faces."*[20]

D7 In general, we consider that there is compelling evidence that the efficient level of the cost of capital has reduced between the RP2 performance plan and these RP3 draft proposals, even before considering the impact of corporate taxation. This reduction in the estimated cost of capital since RP2 is supported by a review of a range of historical and forward-looking market evidence for investors' required rates of return. Other UK regulators have started to reflect this in their recent proposals for the allowed WACC.

D8 By proposing an increase in the vanilla WACC between RP2 and RP3, we consider that NERL's proposals are inconsistent with the broad range of evidence available and significantly overstates the efficient WACC necessary to compensate NERL during RP3. We have therefore provided our own estimate of the pre-tax WACC for these draft proposals.

D9 For these draft proposals, we have estimated the allowed WACC based on the weighted average of the estimated cost of debt and equity finance, and using the capital asset pricing model (CAPM) to estimate the cost of equity. These approaches are commonly used across UK regulated sectors and are consistent with recommendations in the UKRN cost of equity study and NERA's advice to NERL.

D10 In developing these draft proposals, we have also considered how the allowed WACC compares with recent UK regulatory precedent and considered the reasons for differences. We recognise that judgement is required in estimating an efficient WACC and seek to balance the benefits to consumers from using a lower allowed WACC with the significant downside risks for NERL's financeability and incentives to invest if the allowed WACC is set too low.

D11 We discuss below the approach and analysis that has informed our considerations of the different components of the WACC. It is important to note

[20] CAP 1625 - Guidance for NERL in preparing its business plan for Reference Period 3 (January 2018).

that while we have considered these individual elements, we have also made an overall judgement about the appropriate WACC.

Inflation

D12 NERA, in its report for NERL, assumes an RPI forecast of 3.2% p.a. to estimate the RPI-deflated WACC. Separately, NERL's RP3 business plan includes an RPI forecast that increases from 2.88% in 2020 to 3.54% p.a. by 2024, or about 3.3% p.a. on average. Over the same period, CPI increases from 1.57% to 1.96%, or about 1.8% p.a. on average.

D13 We have reviewed recent inflation forecasts published by the HM Treasury[21], the Office for Budget Responsibility (OBR)[22], Bank of England[23] and International Monetary Fund (IMF)[24].

D14 The inflation forecasts from these sources are broadly aligned and support an inflation assumption for RP3 of **2.0% p.a. for CPI** and **3.0% p.a. for RPI** that we use to estimate the WACC in RPI-deflated terms in these draft proposals. This is similar to the inflation forecasts we use in the financial modelling. RPI forecasts are typically higher than CPI (particularly due to the 'formula effect') and these inflation forecasts are consistent with a wedge between RPI and CPI of 1.0% p.a.,which matches the estimate of the long-run difference between RPI and CPI estimated by the OBR in March 2015.[25]

Table D.1 – Inflation for estimating RP3 WACC

	NERL business plan	CAA draft proposal	Notes
RPI inflation	3.2% p.a. (from NERA report on cost of capital)	3.0% p.a.	Reduced to reflect recent external forecasts
CPI inflation	Not in NERA report (c.1.8% in financial model)	2.0% p.a.	Reflects recent external forecasts

Source: CAA analysis

Total market return

D15 We have used a 'decompositional' approach to estimate cost of equity under CAPM, where the total market return (TMR) and risk-free rate (RFR) are estimated separately to derive the equity risk premium (ERP). The TMR is an estimate of the expected return by investors for the market as a whole. This

[21] HM Treasury, Forecasts for the UK economy: a comparison of independent forecasts (November 2018).

[22] Office for Budget Responsibility, Economic and fiscal outlook (October 2018).

[23] Bank of England, Inflation Report (November 2018).

[24] IMF, World Economic Outlook (October 2018).

[25] Office for Budget Responsibility, Economic and fiscal outlook (March 2015).

approach to estimating TMR and RFR separately is broadly consistent with the approaches adopted by NERL and other UK regulators, as the TMR is typically shown to be more stable than the ERP.

D16 In its RP3 business plan, NERL proposes a TMR range of 6.5%-7.1% and a point estimate of 6.8%, based on a report by NERA. NERA's range is based on a review of long-run historical estimates from Dimson, Marsh and Staunton[26] for different holding periods and averaging approaches, with the bottom end of the range reduced by 0.3% reflecting the ONS' estimate for the increase in the RPI 'formula effect' arising from the 2010 change to the method for collecting clothing prices.

D17 The TMR has been subject to a wide-ranging debate during 2018, and a range of new information has been published around estimates of TMR using different historical and forward-looking methods. As different methods can lead to very different estimates of TMR, we consider it is appropriate to consider the wide range of evidence and cross-checks available in forming our judgement on the appropriate TMR.

UKRN cost of equity study

D18 The cost of equity study by Professor Wright *et al* for the UK Regulators Network (UKRN)[27] recommends that the TMR is based on long-run historical averages taking into account both UK and international evidence. Based on their analysis of long-run historical returns in the UK and other markets, the authors propose a TMR range of 6-7%. This is based on long-run historical geometric average returns of not more than 5%, increased by 1-2% to account for serial correlation of returns. The authors note that the case for an adjustment to geometric average returns as large as 2% is weakened if regulators are setting returns on a consistent basis at a relatively long (e.g. 10-year) horizon.

D19 We understand that the 6-7% range for the TMR in the UKRN cost of equity study was estimated in real-CPI terms, using the long-run historical CPI series estimated by the Bank of England.[28] To obtain an equivalent estimate in RPI-deflated terms, the TMR should be reduced for the RPI-CPI wedge estimated above (1%) to 5-6% in RPI-deflated terms. This is consistent with the approaches recently taken by other UK regulators.[29]

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[26] Credit Suisse, Global Investment Returns Yearbook 2017

[27] Professor Stephen Wright *et al*, Estimating the cost of capital for implementation of price controls by UK Regulators (March 2018).

[28] Bank of England, A millennium of macroeconomic data for the UK, Research datasets (2018).

[29] For example, Ofgem (RIIO-2 Sector Specific Methodology Annex: Finance, December 2018) confirmed with study author Professor Wright that it is fair to interpret the TMR range of 6-7% in CPI-terms as 5-6% in RPI

Review of inflation measures in the UKRN cost of equity study

D20 The UKRN cost of equity study estimates long-run average historical returns using a long-run measure of CPI published by the Bank of England. NERA, in its advice to NERL, states that the CPI measure used by the UKRN report authors is unreliable and that the historical real TMR should be estimated using RPI inflation.

D21 We understand that the CPI series is published by the Bank of England as part of a research dataset that does not have official or national statistics status. Our understanding of the inputs to the CPI series used in the UKRN cost of equity study are summarised below.

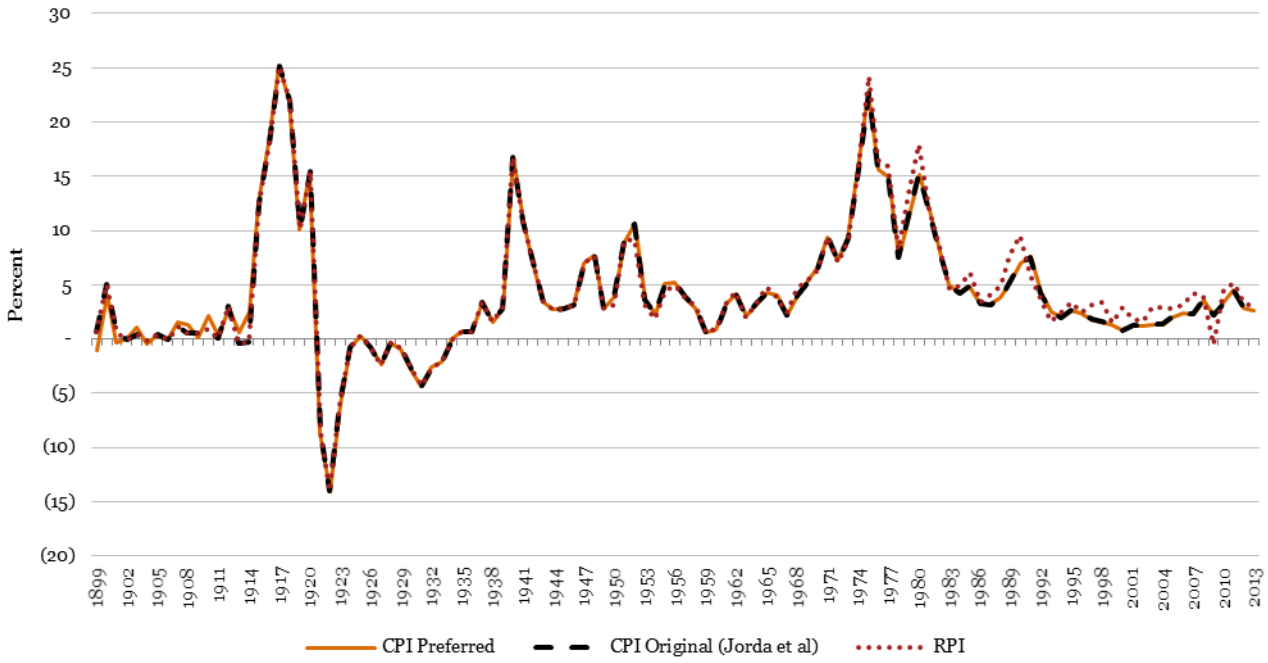
- from 1988, the CPI series is as published by ONS;
- from 1949 to 1988, the CPI series was calculated by the ONS, with the removal of the "formula effect" difference between CPI and RPI;
- prior to 1949, the 'original' CPI series from the Bank of England is based on a consumer expenditure deflator (CED) from the ONS[30], while the same data is also used for the long-run RPI series in the Bank of England dataset. As shown in Figure D.1, there is only a limited difference between RPI and the modelled CPI between 1949 to 1974, so it is not obvious that an adjustment is needed when converting between RPI and CPI prior to this period. This supports the Bank of England's approach in using CED inflation data as a proxy for both CPI and RPI inflation without any adjustment prior to 1949.[31]

terms; and Ofcom expressed the 6-7% TMR range as CPI-deflated (Business connectivity market review, Annex 21 Cost of capital (November 2018)).

[30] O'Donoghue et al, Consumer Price Inflation since 1750, Economic Trends (March 2004).

[31] In addition, we note from Feinstein et al (1972) that the CED includes a measure of imputed rent payment by owner-occupiers and excludes items . This is different to the owner-occupier's costs included in RPI (e.g. mortgage interest payments and depreciation), so CED appears to have a different coverage than RPI.

Figure D.1 – Comparison between CPI and RPI inflation rates from Bank of England Millennium dataset



Source: PwC, Estimating the cost of capital for H7 – Response to stakeholder views, January 2019

D22 PwC, in its update for the CAA on the cost of capital for the next Heathrow Airport price control,[32] has reviewed the CPI and RPI measures from the Bank of England, concluding that the UKRN authors' decision to deflate nominal returns by the Bank of England long-run CPI series provides a suitable estimate of historical average real returns. PwC found that the differences between RPI and CPI diverged from the 1970s and the Bank of England inflation CPI measure provides a long-term estimate to guide investor inflation expectations and real returns.

D23 NERA, in its work for NERL, considers that the Bank of England CPI series is an unreliable basis for deflating nominal returns and that the RPI series used by DMS is more reliable. However, we do not agree on this point. The backcast CPI series from the Bank of England appears to be calibrated to exclude the RPI "formula effect" and other differences such as coverage, so should be a reasonably consistent time series. In contrast, the structural change to RPI (including both the intended increase to measured inflation and the consequential increase in the formula effect) following the change in 2010 to the ONS' measurement of clothing prices means that caution is needed in using historical RPI series as an accurate indicator of future RPI-deflated returns.

D24 Bearing the evidence above in mind, we consider that the CPI series from the Bank of England, while not perfect in terms of providing a consistent time-series

[32] PwC, Estimating the cost of capital for H7 – Response to stakeholder views (January 2019).

from a single underlying source, represents a reasonable basis for deflating historical nominal returns.

Review of holding period and adjustment for serial correlation

D25 NERA, in its advice to NERL, has used the arithmetic average of long-run historical returns to estimate the TMR. The arithmetic average will be an unbiased indicator if returns follow a random walk. NERA also estimates average historical returns using unbiased indictors from "Blume" and "Jacquier, Kane and Marcus (JKM)"[33], concluding that these estimates support the use of arithmetic averages.

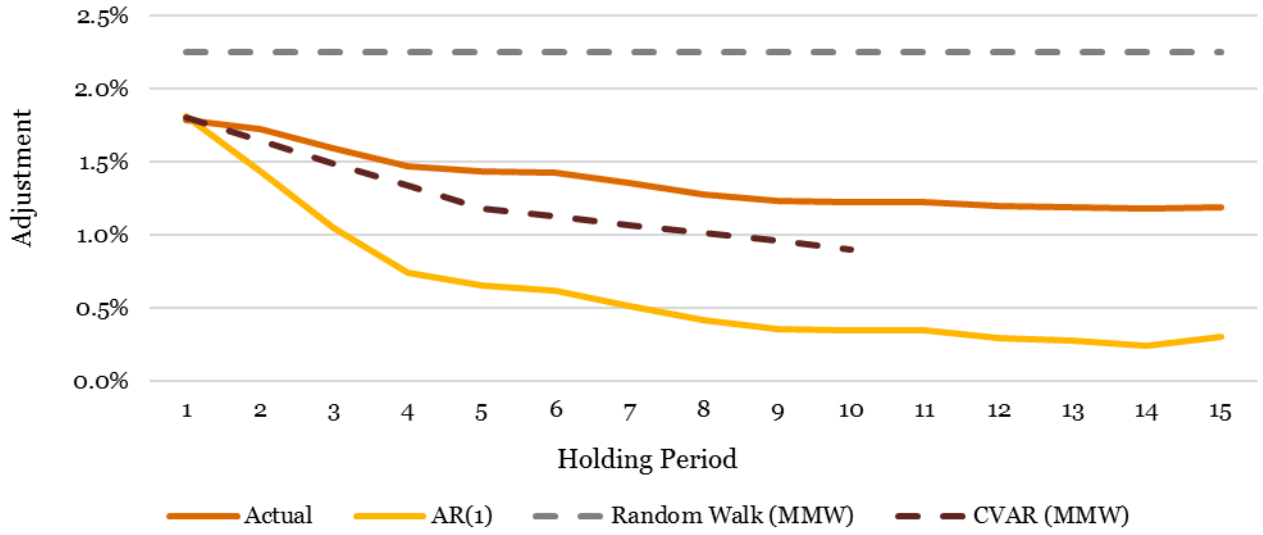
D26 The UKRN cost of equity report suggests that UK regulators estimate TMR starting from the long-run geometric averages, adjusted upwards by 1-2% depending on the extent to which regulators wish to take account of serial correlation of returns, rather than calculating arithmetic averages directly. The reports' authors are concerned that arithmetic averages can generate spurious differences, especially when returns are affected by exchange rate fluctuations.

D27 PwC, in its update for CAA, has examined the variance in returns, including reviewing the UKRN cost of equity study from 2003 and performed additional econometric analysis on the UK equities market. PwC concludes that there is evidence of predictability of returns at longer horizons (e.g. 10 years), which points to a smaller adjustment to the geometric mean for a longer-term holding period. As shown in Figure D.2, PwC's analysis would support an upward adjustment to the geometric mean of around 0.4-1.3% for a 10-year holding period, or 0.7-1.5% for a shorter 5-year holding period, towards the lower end of the 1-2% range in the UKRN cost of equity report.

D28 For example, if a volatility adjustment of 1-1.5% was used, then the TMR range in the UKRN cost of equity report would narrow to 5-5.5% in RPI-deflated terms. Applying a volatility adjustment of 1-1.5% to the average historical UK CPI returns in the UKRN cost of equity study gives an RPI-deflated TMR range of 5.2%-5.7%.

[33] We understand that the Blume adjustment takes a weighted average of the arithmetic and geometric returns and the JKM adjustment calculates the arithmetic mean as a function of the geometric return and variance of returns.

Figure D.2 – PwC's analysis of adjustment to the geometric mean under different return models



Source: PwC, Estimating the cost of capital for H7 – Response to stakeholder views, January 2019.

D29 The UKRN cost of equity report notes that *"while the majority of academic studies do point to return predictability, it remains a controversial topic."* Bearing the above in mind, we consider that the evidence supports the approach in the UKRN cost of equity report, as this range includes a 1-2% upward adjustment to geometric means, where the 2% is broadly in line with arithmetic mean returns (and returns being less predictable) and 1% includes some degree of predictability and appears to be supported by PwC's analysis above for a holding period of around 10-years, which is considered appropriate in the UKRN cost of equity study. The analysis from the UKRN cost of equity study and from PwC above suggests that NERA's approach to using arithmetic returns may overstate the measure of expected returns.

Estimates of average historical returns

D30 Figure D.3 below shows our review of the long-run historical average returns from a range of published sources. Where necessary, we have adjusted published estimates for the expected 1% RPI-CPI wedge and used our expected RPI inflation forecast of 3%.

D31 Many of these sources draw on the same underlying Dimson, Marsh and Staunton dataset of historical average returns, but vary in terms of treatment of inflation (e.g. using the DMS' series or CPI from the Bank of England), method of averaging (e.g. geometric or arithmetic averages), and adjustments (e.g. for serial correlation). In general, these sources show TMR estimates varying between 4.5% to 7% (in RPI-deflated terms), depending on the method applied.

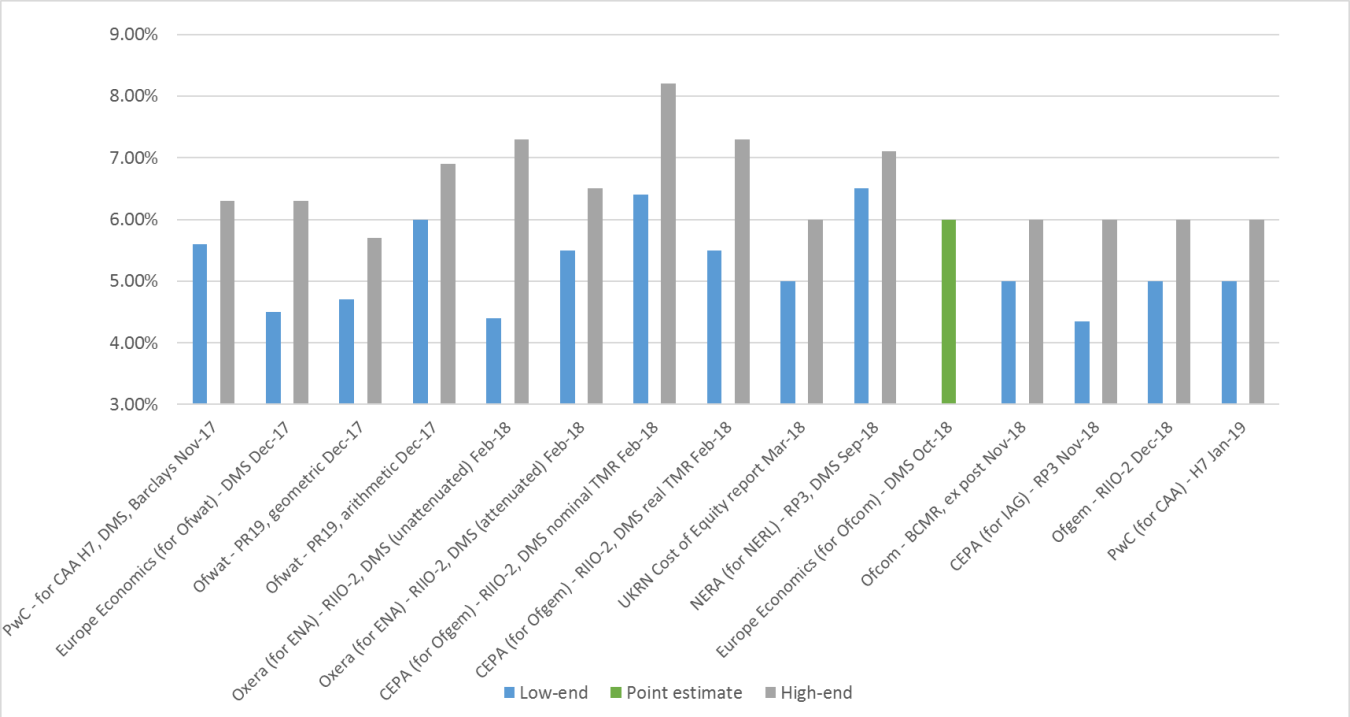
D32 Examining some of the more recent sources:

- PwC, in its work for the CAA, reviewed the long-run historical average returns from Jorda *et al*.[34] This provides an arithmetic average of historical TMR of 7.2% in CPI-deflated terms, or 6.2% in RPI-deflated terms (assuming a 1% RPI-CPI wedge). However, PwC states that the Jorda study does not provide a comparable expected TMR, e.g. adjusting for serial correlation. Taking into account the new evidence available on long-run returns from the UKRN cost of equity report and Jorda *et al*, PwC considers a range of 5-6% is appropriate and that evidence of predictability at longer horizons supports a point estimate towards the lower end of this range.
- CEPA, in its report for IAG, has estimated historical ex ante returns using the historical average returns from DMS dataset, adjusted for one-off factors and inflation. CEPA estimates a range of 5.5-6.0% on an arithmetic average basis and 4.35-4.8% on a geometric average basis, in RPI-deflated terms. NERL has responded that CEPA's estimates are flawed as they do not apply the established methodologies, misinterpret historical DMS data and do not use a reliable measure of inflation.
- Both Ofgem and Ofcom, in recent consultations, consider that average historical returns support a real TMR (in RPI-deflated terms) of 5-6%, in line with the UKRN cost of equity study. Europe Economics, in its advice to Ofcom, estimates a historical TMR of 6%, at the top of this range, based on arithmetic average returns.

D33 We have considered NERA's and NERL's views on the average historical TMR. However, based on our review of the further evidence above on the treatment of inflation and predictability of returns, we consider that the historical average returns in the UKRN cost of equity report provide a reasonable basis for estimating average historical returns in CPI-deflated terms. The resulting range of 5-6% in RPI-deflated terms, when taking into account the OBR's forecast for the future RPI-CPI wedge, is further supported by recent reviews from other UK regulators (Ofcom and Ofgem) and a range of advisors (Europe Economics, PwC and CEPA).

[34] Jorda *et al*, Rate of return on everything, 1870-2015 (2017).

Figure D.3 – CAA review of recent analysis on average historical returns (in RPI-deflated terms)



Source: CAA analysis of range of published sources.

Forward-looking estimates of TMR

D34 A number of UK regulators and advisers have used forward-looking methods, such as dividend-discount models (DDM) or dividend growth models (DGM) and market-to-asset ratios, to inform or cross-check their estimates of TMR.

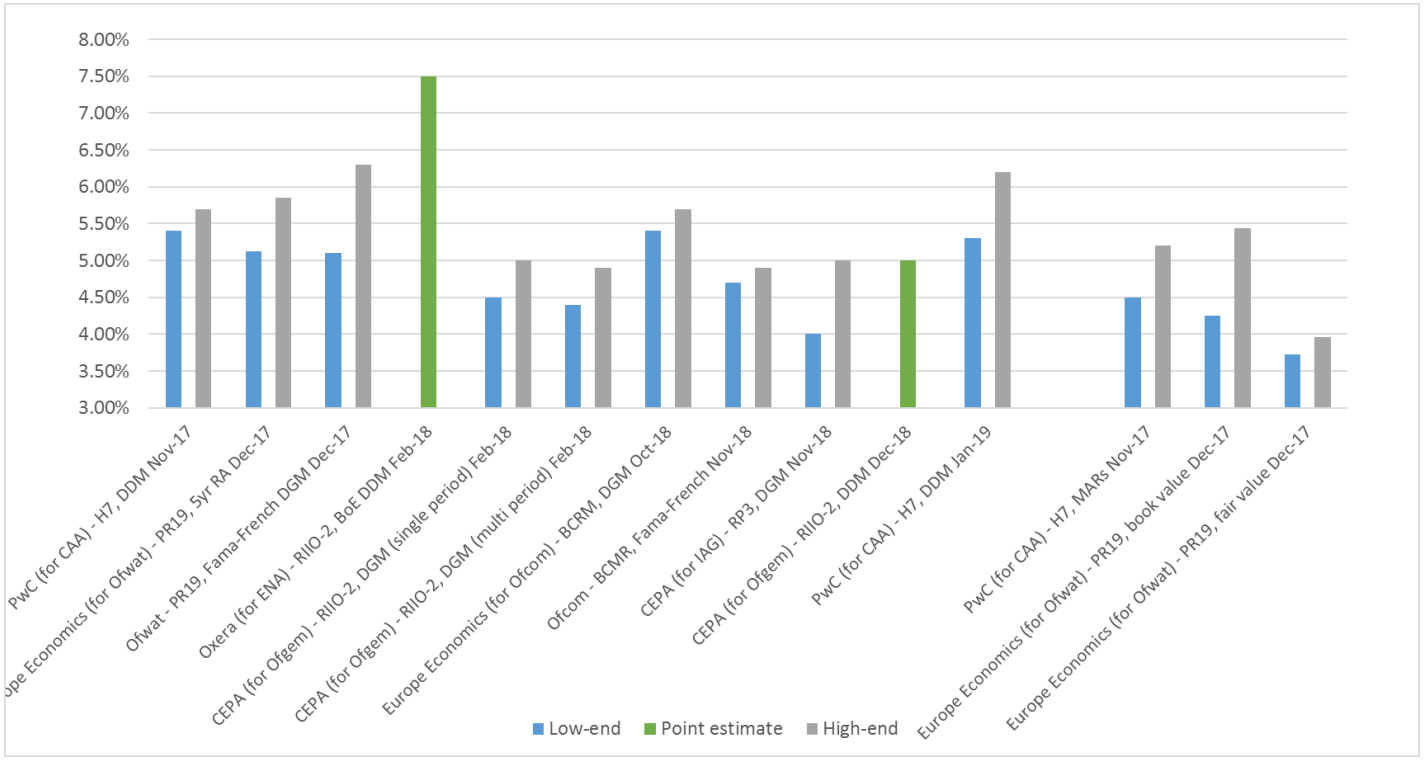
D35 As shown in Figure D.4, recent DDM/DGM analysis by Ofwat, Ofcom, Europe Economics, CEPA and PwC suggest forward-looking estimates of TMR around 4.0-6.3% (in RPI-deflated terms).

D36 PwC has updated its multi-stage GDP-based DDM from its December 2017 report for CAA. Its updated estimates provide a TMR range of 5.3-6.2%, with the upper end of the range driven by the current DDM estimate, which tends to be more volatile. In its updated report, PwC considers that its proposed TMR of 5.1-5.6%, based primarily on forward-looking methods, remains appropriate.

D37 NERA and Oxera have suggested that DDM based estimates form the Bank of England suggest much higher estimates of the forward-looking TMR. However, PwC concludes that the Bank of England models are focused on movements in analyst expectations of equity returns rather than levels of returns, making them unsuitable for informing views on the forward-looking TMR.

D38 We consider that estimates from forward-looking methods provide another relevant piece of evidence to inform the appropriate estimate of the TMR, in addition to the TMR estimates from historical average returns. We note that there is a degree of overlap between some estimates of TMR from long-run historical averages and forward-looking methods, with a range of 5-6% in RPI-deflated terms.

Figure D.4 – CAA review of recent analysis on forward-looking returns (in RPI-deflated terms)



Source: CAA analysis of range of published sources.

Recent regulatory precedent

D39 We have reviewed the recent UK regulatory precedent for TMR, converted to RPI-deflated terms, summarised in Figure D.5 below. For other UK regulators:

- Ofwat set a provisional TMR for PR19 of 5.44%;[35]
- Ofcom set a TMR of 5.7% in its consultation on the business connectivity market;[36] and

[35] Ofwat, Delivering Water 2020, Appendix 12: Aligning risk and return (December 2017).

[36] Ofcom, Business connectivity market review, Annex 21 Cost of capital (November 2018). This assumes RPI inflation of 3% p.a.

- Ofgem is consulting on a TMR of 5.2-5.7% for RIIO-2.[37]

D40 In broad terms, this shows that TMR estimates from other UK regulators have reduced significantly since previous price reviews. While the different UK regulators seem to place different weight on forward-looking and historical average return methods, there is a broad consistency in the estimated TMR to be significantly below 6%, in RPI-deflated terms.

D41 Figure D.5 also shows TMR ranges published by a range of specialist advisors to regulators and companies. This shows that NERA appears to be an outlier in proposing an RPI-deflated TMR above 6.5%.

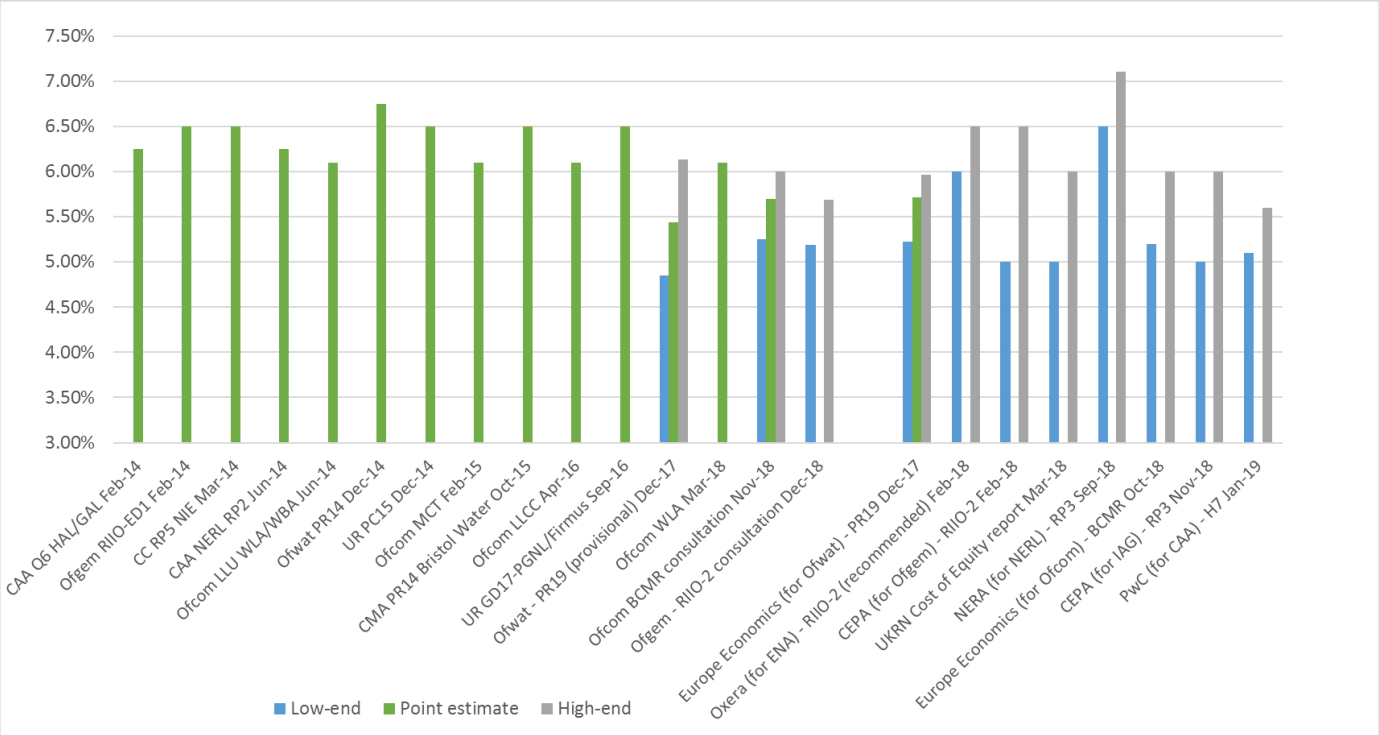
D42 Looking outside the UK, Europe Economics, in its work for Ofwat, reviewed international regulatory precedent. Europe Economics concluded that this supported a TMR range of 6.3-7.8% in real CPI terms, which would be around 5.3-6.8% in RPI-deflated terms.[38] PwC also reviewed the airport charges agreement for Charles de Gaulle Airport, concluding that this is consistent with a TMR of 6.3% in RPI-deflated terms.[39]

[37] Ofgem, RIIO-2 Sector Specific Methodology Annex: Finance (December 2018).

[38] Europe Economics, PR19 – Initial Assessment of the Cost of Capital (December 2017).

[39] PwC, Estimating the cost of capital for H7 – Response to stakeholder views (January 2019).

Figure D.5 – CAA review of regulatory precedent and advisor views on TMR (in RPI-deflated terms)



Source: CAA analysis of range of published sources.

Professional investor studies

D43 Ofgem has reviewed a range of market returns forecasts from asset managers and financial organisations. This review found that investors should expect returns over the medium to long-term of 6.6% (in nominal terms) on average, or a range from 4.5% to 7.75%. In RPI-deflated terms with RPI of 3%, the range is around 1.5-4.7% with an average of 3.6%.

D44 This relatively low level of expected returns compared with historical levels seems to be a common trend among market analysts. In 2016 the think tank McKinsey Global Institute concluded that *"over the next 20 years, total returns including dividends and capital appreciation could be considerably lower than they were in the past three decades"* and that *"even if GDP growth rates were to return to the trend rate of the past 50 years, other factors could dampen annual returns over the coming decades by 150 to 400 basis points compared with returns earned in the past 30 years"*.[40]

[40] McKinsey Global Institute, Diminishing returns: why investors may need to lower their expectations (May 2016).

D45 This suggests that, while historical evidence might support higher figures for TMR of 5-6% in RPI-deflated terms, a review of market returns forecasts might support even lower expectations for future returns.

Overall CAA view on TMR

D46 We have considered the broad range of evidence above on TMR, including historical average returns, forward-looking returns, current market information and regulatory precedent, to form its judgement on the appropriate TMR for the RP3 WACC.

D47 We consider that the broad range of evidence supports a TMR range of **5.0% to 6.25% in RPI-deflated terms**. The low end of the range is in line with the low-end of TMR estimates based on average historical returns (from the UKRN cost of equity report), forward-looking returns (from PwC's report for CAA on H7 and from other advisors) and from regulatory precedent (Ofwat, Ofcom and Ofgem). The high end of the range is our estimate for RP2 and Q6 price controls, consistent with the overall finding that expected returns have reduced since previous price reviews. However, we note that most sources suggest a TMR of no more than 6%.

D48 This range lies significantly below the range from NERA of 6.5-7.1%. This is expected as we understand that NERA's analysis does not put any weight on the range from the UKRN cost of equity report or forward-looking approaches. As shown above, however, NERA appears to be an outlier in terms of its proposed range.

D49 For these draft proposals we have used a **point estimate of 5.4% in RPI-deflated terms** to inform our overall WACC estimate, towards the lower end of the 5-6.25% range above. We have chosen this point estimate based on analysis of average historical returns (being near the mid-point of the range from the UKRN cost of equity report), supported by estimates from forward-looking methods and regulatory precedent – it is close to the mid-points of the ranges from Ofgem for RIIO-2, Ofwat's guidance for PR19 and PwC's advice to CAA for H7.

Risk-free rate

D50 The risk-free rate (RFR) is an input to the cost of equity under CAPM.

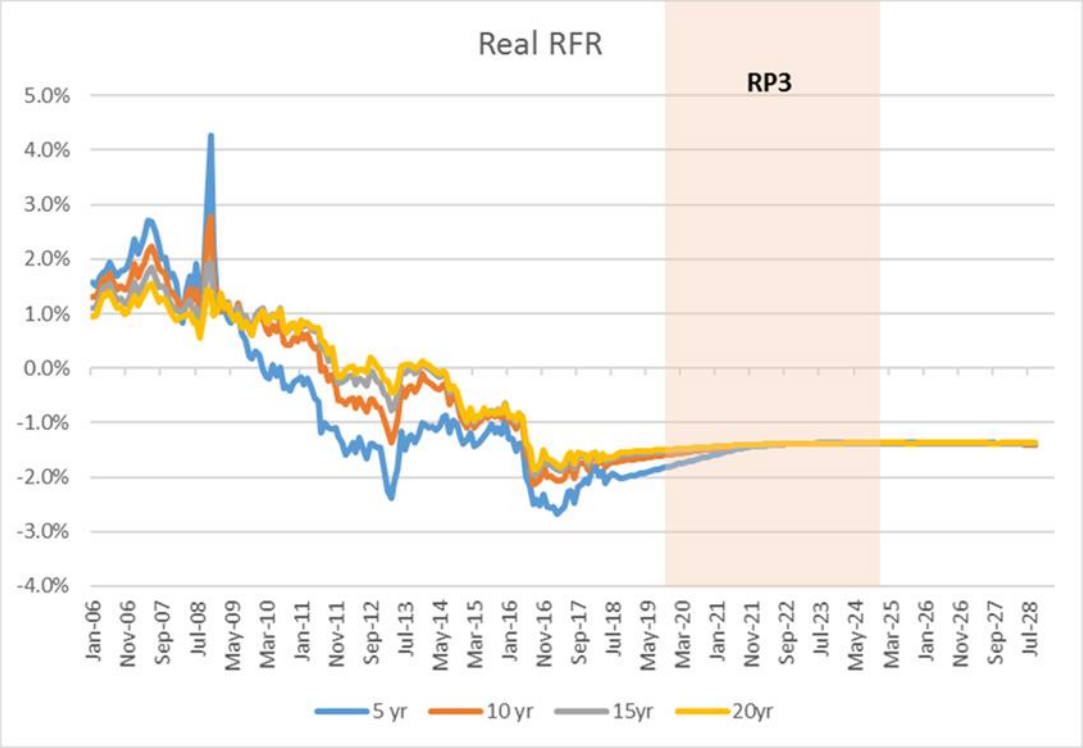
D51 For RP3, NERL has proposed an RPI-deflated RFR of 0.46%, just above the mid-point in NERA's range from -1.1% (based on UK 10-year government yields in August 2018 and forward rates to mid-point of RP3) to 1.5% (based on long-run historical market evidence adjusted for current market conditions).

D52 The UKRN cost of equity report considered potential justifications for not adopting negative risk-free rate. In summary, they found that there is no economic principle that rules out negative risk-free rate and recommended that:

"Regulators should use the (zero coupon) yield on inflation-indexed gilts at their chosen horizon to derive an estimate of the risk-free rate at that horizon" even if there are arguments that the market for risk-free debt may be distorted.

D53 Consistent with this, we have reviewed the evidence from index-linked gilts (ILGs), as a proxy for the RFR in RPI-deflated terms. Based on market evidence at the end of September 2018, we produced implied forward-gilt yields at different given maturities for a period covering RP3 (2020-2024). The results are set out in Figure D.6 below.

Figure D.6 – Forward rates for index-linked gilts over 5-year to 20-year horizons



Source: CAA analysis of gilt yields published by the Bank of England.

D54 By and large, the chart demonstrates that markets anticipate that yields on ILGs will increase slightly from current market values over RP3, but that yields will remain low and negative for an extended period. At the mid-point of RP3 (July 2022), we estimate a RFR of -1.4% based on 10-year ILGs. From our analysis, this estimate only changes slightly based on different estimation methods (e.g. cross-checking using spot values from the prior six months and using a 10-year trailing average) or maturities (5, 15 and 20-year ILGs).

D55 We noted that nominal gilts would lead to a higher estimate for the RFR (closer to -0.9%), though this was sensitive to the assumed level of inflation and would be a departure from the approach recommended by the UKRN cost of equity report.

D56 We have checked that the estimated RFR of -1.4% appears reasonable when compared with other recent estimates:

- it is within the range proposed by PwC in its report for CAA on H7 (-1.5% to -1.0%), based on spot market evidence and forward-looking evidence;
- it is within the range proposed by CEPA, in its report for IAG (-1.84% to -1.34%), based on the current spot rate and 1-month trailing average of 10-year ILGs;
- it is close to Ofgem's recent consultation on RIIO-2 and Ofcom's recent business connectivity market review. Ofgem expects to move away from setting the RFR on an ex-ante basis to using indexation based on average 20-year zero coupon gilt rate for October. Ofgem estimates a spot rate in October 2018 of -1.68%, which would increase slightly based on current implied forward-gilt curves. Ofcom in its consultation on wholesale local access network has proposed to move away from using a zero RFR (in RPI-deflated terms) to a negative RFR of -1.25%. This reflects Ofcom's proposal to place more weight on recent market evidence for 10-year index-linked gilts and citing the recommendations in the UKRN cost of equity report iterating the most recent market evidence; and
- while it is above Ofwat's proposed RFR of -0.88% for PR19, we would expect our proposal to be lower given the earlier timing of Ofwat's publication (as ILG forward curves generally flattened in 2018) and Ofwat has put more weight on using nominal gilts deflated using RPI forecasts to derive the RFR.

D57 Based on the review of empirical evidence and regulatory precedent, we use a **RFR of -1.4% (in RPI-deflated terms)** to inform our overall WACC estimate in these draft proposals. An appropriate range appears to be from **-1.5% to -0.9%** based on respectively, the high end of the PwC range and the alternative approach to estimating the RFR based on nominal gilts deflated for RPI forecast.

Gearing

D58 In its RP3 business plan, NERL proposed a gearing level of 60% to calculate its cost of capital, in line with the rate set by the CAA in RP2. In NERL's RP3 business plan, actual gearing increases from around 30% in 2017 to around 60% by 2024.

D59 NERA supports the use of a notional gearing approach as this helps ensure the regulated company and their shareholders bear the risk of financing structure and are incentivised to outperform. NERA notes that the final gearing assumption should depend on the outcome of the financeability assessment, which will show whether a notional gearing of 60% continues to allow NERL to maintain a targeted investment-grade credit rating.

D60 Europe Economics, in its advice to CAA has also recommended starting from an initial notional gearing of 60% for NERL, after considering trends in gearing in the UK corporate sector and UK utilities. They also note this assumption could be revised in light of the financeability analysis.

D61 We note that a notional gearing level of 60% appears broadly consistent with wider UK regulatory precedent. For example, both Ofwat and Ofgem have adopted notional gearing on 60% in recent PR19 and RIIO-2 publications.

D62 For these draft proposals, we have used a **notional gearing assumption of 60%**. As shown in chapter 7, our financeability testing for these draft proposals indicates that this level still allows NERL to maintain its investment-grade credit rating.

D63 We note that a notional gearing of 60% also provides reasonable headroom to the gearing cap of 65% in NERL's licence. However, we emphasise that 60% gearing, also cited in the licence, should not be interpreted as a target level of gearing set by the CAA and responsibility for maintaining an investment grade credit rating sits firmly with NERL's management.

Equity beta

D64 The TMR represents the returns required by investors on equities of average risk. Under the CAPM framework, the equity beta measures the systematic risk of a particular equity investment. The higher the equity beta, the larger the required compensation equity investors require for bearing the additional systematic risk. In general, UK regulators have estimated the equity beta based on estimates of the underlying asset beta and debt betas, re-levered using the notional level of gearing.

D65 In its RP3 business plan, NERL proposes an asset beta of 0.61, a debt beta of 0.05 and an equity beta of 1.45. This is the mid-point of NERA's equity beta range for NERL of 1.33 to 1.58. The lower bound of NERA's asset beta is based on the two-year asset beta of Aeroports de Paris (ADP), which NERA considered provided a similar traffic risk to NERL, and the upper bound is based on the two-year asset beta from a subset of international listed airports. NERA's range is significantly above the CAA's allowance for RP2 (0.505 asset beta, 0.1 debt beta and 1.1125 equity beta).

D66 We commissioned Europe Economics to advise us on appropriate betas for NERL, including reviewing the analysis by NERA. The detailed findings are set out in Europe Economics' report.[41] In summary, Europe Economics found that:

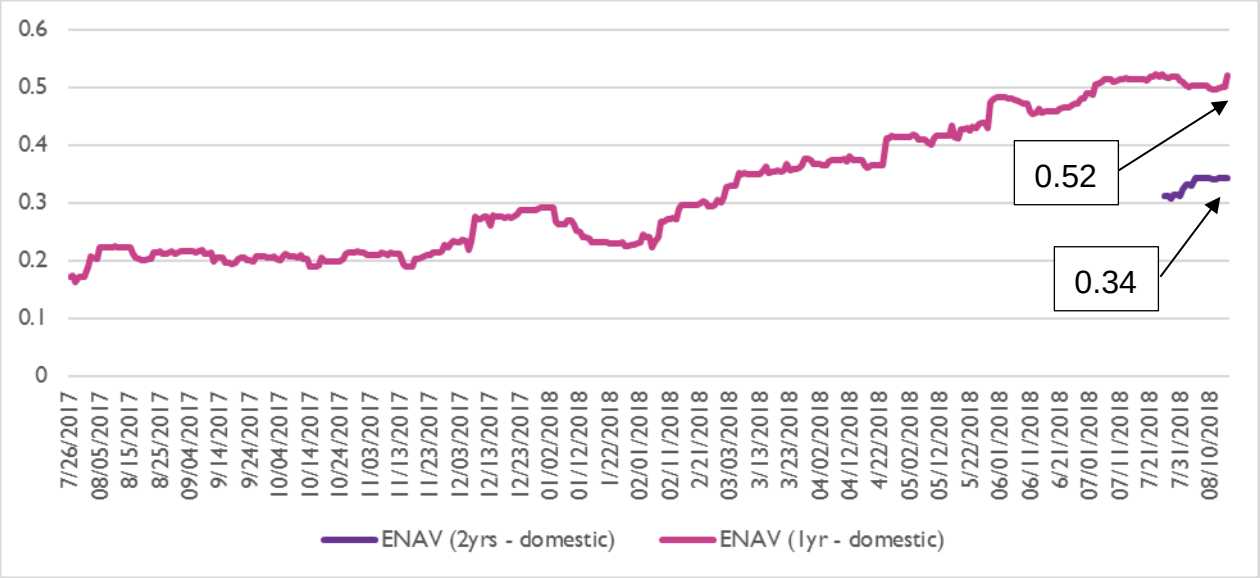
- NERL's asset beta should be expected to be lower than for UK airports given greater demand diversification and partial protection from demand risks. But,

[41] Europe Economics, Components of the cost of capital for NERL (December 2018).

NERL's asset beta should be no lower than that of UK utilities, as typical utilities face no demand risks given their price controls are set using a revenue cap. In addition, NERL's betas should take account of its relatively high operating leverage (i.e. the level of its fixed costs relative to its variable costs);

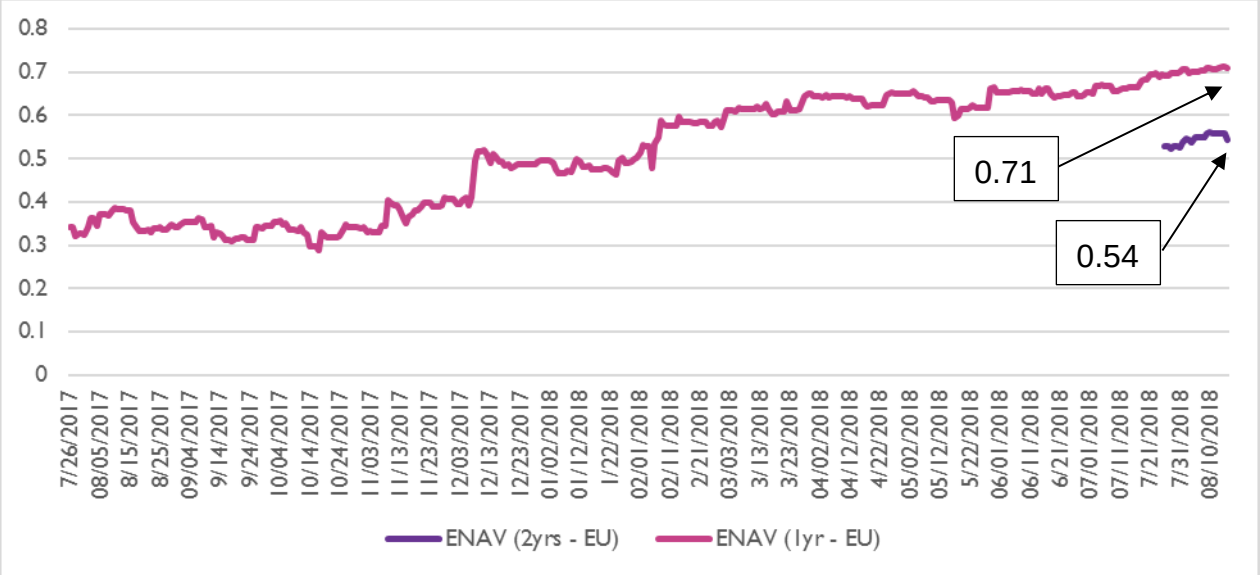
- based on its review of the betas of UK utilities (as a lower bound for NERL's beta) and UK airports (as an upper bound of NERL's beta), Europe Economics estimates a "constraint range" for the asset beta of 0.46-0.54. The lower bound of UK utilities reflects utilities with a share of non-regulated revenues, so is above pure regulated utilities, reflecting the greater level of risk faced by NERL;
- ENAV, the Italian ANSP, which is publicly listed, is a suitable comparator for NERL. Europe Economics estimates an asset beta range of 0.29 to 0.54 from the notional 'en-route' portion of ENAV, based mainly on the 2-year asset betas relative to the Italian domestic and European markets, which it uses as the "comparator range" for NERL. Figures D.7 and D.8 below shows Europe Economics' analysis of ENAV's betas against domestic and European indices;
- the asset beta for NERL should be consistent with both the comparator and constraint ranges above. Europe Economics concludes that an appropriate asset beta for NERL would lie above the mid-point of the comparator range at 0.46 or higher. This accounts for the finding that NERL has slightly higher operational leverage than ENAV, as this would increase the mid-point of the comparator range to around 0.46;
- an appropriate debt beta would be 0.19, based on its estimates of NERL's cost of debt. Europe Economics cites precedent from the Competition Commission CAA Q5 review as supporting a debt beta in the range 0.09 to 0.19, as well as other recent UK regulatory precedent, to recommend an overall range of 0.1-0.19;
- the evidence on asset and debt beta ranges support overall equity beta range of 0.44 to 1.20 based on the comparator range only, or 0.87 to 1.20 based on the overlap with the constraint ranges.

Figure D.7 – 1-year and 2-year unlevered betas for ENAV (vs domestic index)



Source: Europe Economics, Components of the cost of capital for NERL, December 2018

Figure D.8 – 1-year and 2-year unlevered betas for ENAV (vs European index)



Source: Europe Economics, Components of the cost of capital for NERL, December 2018

D67 NERA, in its report for NERL, estimates the beta for ENAV giving similar (and slightly lower) estimates than from the Europe Economics report when measured relative to the European market (in the range 0.52 to 0.66, compared with 0.54 to 0.71 estimated by Europe Economics).

D68 Europe Economics, in contrast, also places weight on the longer-term 2-year betas and analysis of the betas against the domestic market index. Further to this, Europe Economics does not find evidence that Italian betas are materially

suppressed, as concluded by NERA, and finds that the movement of NERL's beta is in line with other Italian utilities.

D69 CEPA, in its report for IAG, estimates an asset beta range for NERL of 0.43 (based on a weighted average of low estimates for airports and utility networks) to 0.50 (based on high estimates for airports and networks and ENAV's beta). CEPA is concerned that the airport comparators selected by NERA could overestimate NERL's beta, based on weights applied to the comparators and because this does not account for the potential additional systematic risk at airports from non-aeronautical revenues.

D70 Based on the findings above, for these draft proposals we have used an **asset beta of 0.46** to inform our overall WACC estimate in these draft proposals. This estimate is based on the estimate from Europe Economics, which is slightly above the mid-point in Europe Economics' estimate of ENAV's asset beta and is within the relevant bound from a selection of utility and airport comparators. We consider this provides a reasonable estimate of ENAV's asset beta by putting weight on the estimated beta over a longer timeframe (2-years, rather than 1-year) and considering movements against the domestic index. Also, while NERA provides evidence that NERL's beta should be higher than ENAV, CEPA provides evidence to support the opposite. It is therefore not clear that an adjustment to ENAV's beta is needed in addition to the adjustment applied by Europe Economics' for NERL's higher operating leverage. Europe Economics has also put some weight on utility comparators, in addition to airports, as relevant comparators to NERL as a regulated company, while recognising the higher demand risks that NERL faces.

D71 We have sense-checked this 0.46 asset beta against recent regulatory precedent, noting that this is significantly above the recent estimates from Ofwat (0.37 in Ofwat's PR19 guidance) and Ofgem (0.35-0.36 in Ofgem's RIIO-2 methodology consultation). Moreover, the asset beta is slightly below the mid-point of PwC's estimated range for Heathrow Airport (0.42-0.52, based on 2-year daily and 5-year monthly asset betas for ADP and Fraport, measured against both local and European indices), so seems to be broadly consistent with Europe Economics' conclusion that NERL's asset beta should be below that of UK airports.

D72 For these draft proposals, we do not consider that additional adjustments are required to reflect the performance regulation, which shows that NERL will continue to have strong protections against elements of systematic risks from traffic risk-sharing and pension cost pass-through.

D73 For these draft proposals, we use an **asset beta within the range of 0.46 to 0.505**. The lower end is from Europe Economics' analysis, reflecting the asset beta used in these proposals, while the upper end was the allowed asset beta at RP2.

D74 For the debt beta, NERA, in its advice for NERL, has used a debt beta of 0.05 in line with PwC's December 2017 report for CAA on Heathrow Airport and cross-checked with academic estimates. However, we note that PwC in its updated report for CAA has increased its debt beta assumption from 0.05 to 0.1 given recent market movements. Europe Economics, in its report for CAA, has used empirical methods and regulatory precedent to support a range of 0.1-0.19 for NERL's debt beta.

D75 We have considered evidence from Europe Economics that the debt beta should be higher than the level set at RP2 (0.1). We also note that Ofgem has proposed a debt beta of 0.1-0.15 in its RIIO-2 methodology consultation, though Ofwat and Ofcom used a debt beta of 0.1 in recent publications. On balance, we consider there to be some evidence that debt betas are higher than was assumed at RP2, though the estimate preferred by Europe Economics (0.19) is significantly higher than has been used previously by UK regulators. Given the balance of evidence points to a debt beta towards the bottom end of this range, we have used a **debt beta of 0.13** to inform our overall WACC estimate in these draft proposals.

D76 Taking the asset beta of 0.46 and debt beta of 0.13, we have used an **equity beta of 0.96** to inform our overall WACC estimate in these draft proposals. This is within an **equity beta range of 0.87 to 1.11**, based on the asset beta range of 0.46-0.505 and debt beta range of 0.1-0.19. While this is significantly below the levels proposed by NERL in its business plan, we consider these betas reflect a broad range of market evidence and recent regulatory precedent, which overall support a beta that is lower than at RP2. In selecting the appropriate beta, we have also considered the wider regulatory framework and risks faced by NERL. NERL will receive strong protection from unforeseen changes in pensions costs and traffic risks through the regulatory framework, which will reduce its exposure to systematic market risk.

Table D.1 – Betas for RP3 WACC

	Asset beta	Debt beta	Equity beta
CAA RP2	0.505	0.10	1.11
NERA's report for NERL	0.56-0.66	0.05	1.33-1.58
NERL's business plan	0.61	0.05	1.45
Europe Economics report for CAA	0.46-0.54 (recommends 0.46 or higher)	0.10-0.19	0.87-1.20
CEPA report for IAG	0.43-0.50	0	0.96-1.11
CAA's draft proposals	0.46 (Range: 0.46-0.505)	0.13 (Range: 0.10-0.19)	0.96 (Range: 0.87-1.11)

Source: CAA analysis

Post-tax cost of equity

D77 NERL proposes a post-tax cost of equity of 9.65% (RPI-deflated), based on the CAPM approach and its estimates for the TMR, RFR and equity beta.[42] This is the mid-point of the range estimated by NERA of 8.97% to 10.32% and is significantly above the allowed cost of equity set at RP2 (6.87%).

D78 Based on our proposed range and point estimates above for the TMR, RFR and equity beta and using the same CAPM approach, we use a **range for the post-tax cost of equity of 4.12% to 7.05%**, with a **point estimate of 5.13%** (RPI-deflated) to inform our overall WACC estimate in these draft proposals.[43] Our estimate is significantly below the estimate proposed by NERL due to lower estimates for the RFR, TMR and equity beta.

D79 Our proposal is within the range estimated by CEPA for IAG (4.70% to 6.82%). However, CEPA assumed a zero debt beta. Introducing a debt beta similar to our proposed range would significantly reduce its cost of equity range.

D80 Our point estimate is higher than the post-tax cost of equity in recent publications from Ofwat for PR19 (4.01%), Ofgem for RIIO-2 (2.96%) and Ofcom for Openreach (4.42%) We would expect NERL to have a higher cost of equity as NERL faces a portion of demand risk, unlike the regulated water and energy companies.

D81 Ofgem, in its RIIO-2 methodology consultation provided a number of cross-checks from investment managers and advisers, bids for offshore electricity transmission assets and infrastructure fund discount rates. Ofgem concludes that these checks support Ofgem's CAPM cost of equity range of 4-5% in CPIH-deflated terms, or 2.96-3.95% in RPI-terms. We consider that market-based measures can provide useful cross-checks for the efficient cost of equity for NERL, though recognise that the nature of risks faced by NERL, such as its share of traffic risks, are likely to support a higher cost of equity for NERL for RP3.

Table D.2 – Post-tax cost of equity for RP3 WACC

	NERL business plan	CAA draft proposal	Notes
Post-tax cost of equity (RPI-deflated)	9.65%	5.13%	CAA has used lower estimates for risk-free rate, beta and total market return to calculate the cost of equity using CAPM

Source: CAA analysis

[42] The post-tax cost of equity is calculated as: RFR + Equity beta * (TMR – RFR).

[43] The CAA's draft proposed post-tax cost of equity of 5.13% (RPI-deflated), is calculated as: RFR (-1.4%) + Equity beta (0.96) * [TMR (5.4%) – RFR (-1.4%)].

Cost and proportion of embedded debt

D82 NERL has proposed a cost of embedded debt of 2.13%, based on the nominal yield at issuance of NERL's existing bond (5.4%), deflated by NERA's inflation forecast of 3.2% (using the Fisher formula). NERL's existing bond has a declining balance and is due to mature in 2026.

D83 PwC reviewed the efficiency of the cost of the existing bond for CAA at RP2. As PwC did not identify any issues, we used this as the basis of the cost of embedded debt at RP2. We consider this approach remains appropriate for RP3.

D84 Using the same nominal cost of debt of 5.4%, we use a **cost of embedded debt of 2.3%** in RPI-deflated terms to inform our overall WACC estimate in these draft proposals, using the Fisher formula and our RPI forecast of 3.0% for RP3. This is higher than NERL's estimate given its higher forecast for RPI inflation over RP3 of 3.2%.

D85 We have reviewed the average proportions of embedded and new debt in RP3 from NERL's RP3 business plan and concluded that NERL's assumption of an embedded debt proportion of 30% (70% new debt) appears reasonable. We therefore use a **proportion of embedded debt of 30%** to inform our overall WACC estimate in these draft proposals.

Table D.3 – Cost of embedded debt for RP3 WACC

	NERL business plan	CAA draft proposal	Notes
Cost of embedded debt (RPI-deflated)	2.13%	2.30%	CAA has increased to reflect our updated RPI forecast, which is lower than used by NERL
Proportion of embedded debt	30%	30%	No change to NERL's business plan

Source: CAA analysis

Cost of new debt

D86 In RP2, we set a cost of new debt of 1.75% (RPI-deflated). Since 2014, the costs of debt for regulated UK utilities have fallen significantly, with much lower cost of debt estimates being proposed by other UK regulators in recent publications.

D87 In its RP3 business plan, NERL proposed a cost of new debt of 0.42% (RPI-deflated). This was based on estimates from its advisors NERA, starting from the yield on its existing bond with adjustments for a longer maturity, expected increases in rates to mid-RP3 and a notice period premium, reflecting that debt-holders will expect a higher cost of holding debt beyond NERL's 10-year rolling notice period.

D88 We commissioned Europe Economics to provide an estimate for NERL's cost of new debt.[44] Europe Economics start by performing a similar calculation to NERA's approach, though with smaller adjustments. The differences are summarised in Table D.4 below.

Table D.4 – Calculation of cost of new debt for RP3 based on existing NERL bond

	NERA	Europe Economics	Notes
Yield on existing bond	1.73%	1.71%	Very small difference, as NERA calculated using one-month average, Europe Economics uses latest spot rate
Adjustment for forward rates to reflect expected increases in rates to mid-RP3	0.63%	0.52%	NERA used UK 10-yr gilt curve. Europe Economics also uses 10-yr gilts and a similar approach but estimates a slightly lower forward rate adjustment to mid-RP3
Adjustment for liquidity and inflation risk term to reflect future uncertainty in longer-term bonds	-	-0.10%	Europe Economics proposes an adjustment based on academic studies, adjusted to reflect the four-year ahead timescale of RP3
Adjustment to reflect difference in maturity between existing bond and new debt	0.78%	0.40%	NERA assumes a 15-year maturity for new debt and estimates an adjustment based on A-rated iBoxx index. Europe Economics assumes a 10-year maturity for new debt and estimates an adjustment based on UK gilts
Notice period premium to reflect cost of holding debt beyond rolling 10-year licence period	0.50%	0.50%	Both NERA and Europe Economcis propose the adjustment, based on a report from Europe Economics for CAA in 2015[45]
Cost of new debt (nominal)	3.64%	3.03%	

Source: CAA analysis of NERL's RP3 business plan and Europe Economics' report

D89 Europe Economics also estimates cost of new debt using a top-down approach by using iBoxx data to estimate the yield for an A-and-above Utilities bond (3.24% in nominal terms). Europe Economics adjusts this estimate for the same forward rate and liquidity risk adjustments (0.42%) and deducts 0.2% to reflect the longer term of 10+ iBoxx series, to obtain an overall estimate of 3.46%.

[44] Europe Economics, Components of the cost of capital for NERL (December 2018).

[45] Europe Economics, Implications for debt – raising and the cost of debt of changing the minimum termination notice period for NERL's licence (September 2015).

Europe Economics recommends choosing the mid-point of its range from the bottom-up (3.03%) and top-down approaches (3.46%), which would give an estimate for cost of new debt of 3.25% (in nominal terms).

D90 We consider that Europe Economics' analysis provides an appropriate starting point for these draft proposals (though we also cross-check below against NERA's estimate given NERA has assumed a 15-year maturity for new debt, while Europe Economics has assumed a 10-year maturity), but that two adjustments are appropriate.

- There is not sufficiently compelling evidence at this stage to support the upward adjustment for the notice period premium of 0.5%. We consider that there is strong protection in the UK RAB-based regulatory framework that should provide reasonable protection for debt holders under a rolling licence period. Moreover, if the cost of raising bonds beyond the rolling licence period was significantly higher in practice, then NERL may be able to mitigate some of this increase (e.g. by issuing shorter-term bonds or considering other forms of debt). We note that CEPA, in its report for IAG,[46] also raised concerns around Europe Economics' analysis which suggests the impact of the notice period on the cost of debt may be materially overstated.
- There is not sufficiently compelling evidence at this stage to support the downward adjustment for liquidity and inflation risk term of 0.1%. We note from Europe Economics' report and further evidence from NERA that this estimate can be highly variable and uncertain. This adjustment also appears not to be used by other UK regulators in recent publications.

D91 Bearing the above in mind we have adjusted Europe Economics' range to remove the adjustments for liquidity and inflation risk, and the notice period premium. This has a net reduction of 0.4% to Europe Economics' estimate based on the cost of NERL's bond, reducing this from 3.03% to 2.63% (in nominal terms). This has a net increase of 0.1% to Europe Economics' notional estimate based on iBoxx indices, from 3.46% to 3.56% (in nominal terms). Following Europe Economics' approach of taking the mid-point of these estimates give a cost of new debt of 3.10% (in nominal terms).

D92 For these draft proposals, we use a real **cost of new debt of 0.1%** to inform our overall WACC estimate in these draft proposals, based on the 3.10% in nominal terms, deflated by our RPI forecast of 3.0% p.a. We use a **cost of new debt range of -0.4% to 0.5%** based on the range of estimates above (2.63% to 3.56% in nominal terms), deflated using RPI inflation assumption of 3%.

[46] CEPA, Cost of capital for NATS (En-Route) plc (November 2018).

D93 We have cross-checked that the cost of new debt of 3.10% is close to NERA's estimate for the cost of new debt if you also remove the notice period premium of 0.5% for consistency (which reduces its estimate from 3.64% to 3.14%).

D94 CEPA, in its report for IAG recommended a cost of new debt from 2.20% (based on nominal yield of NERL's existing bond of 1.73% adjusted for forward rates but not maturity) to 2.64% (based on adjustment for forward rates and maturity). We consider that CEPA's approach provides a useful cross-check though notes that CEPA has not cross-checked this against the notional iBoxx index, so this range may understate the cost of new debt.

D95 NERA proposes an additional transaction cost of 0.15% for new debt based on the allowed cost at RP2. Europe Economics estimates a lower transaction cost of 0.07% based on its analysis of issuance and liquidity costs for utility companies.

D96 From a review of recent regulatory precedent, in general an allowance of 0.10% is included for the cost of new debt (e.g. this is adopted by Ofwat in its guidance for PR19, Ofcom in its consultation on the business connectivity market review and in PwC's advice to CAA on the next Heathrow Airport price control). For these draft proposals, we include a **transaction cost of 0.1%** to inform our overall WACC estimate in these draft proposals, which is between the estimates from NERA and Europe Economics.

Table D.5 – Cost of new debt for RP3 WACC

	NERL business plan	CAA draft proposal	Notes
Cost of new debt (RPI-deflated)	0.42%	0.10%	Reduced to reflect evidence from Europe Economics and removed notice period premium
Transaction cost	0.15%	0.10%	Reduced to reflect evidence form Europe Economics and regulatory precedent

Source: CAA analysis

Cost of debt

D97 NERL proposed an overall cost of debt of 1.08% (in RPI-deflated terms), consistent with the estimate by NERA.

D98 Our draft proposals use a **cost of debt of 0.86%**, **with a range of 0.51% to 1.14%** to inform our overall WACC estimate in these draft proposals. The cost of debt of 0.86% is calculated as the weighted average of the cost of new debt (0.1% cost * 70% proportion) and cost of embedded debt (2.3% * 30% proportion), plus an allowance for transaction costs of new debt (0.1%). This is lower than estimated by NERA as it reflects the lower cost of new debt, partially offset by a higher cost of embedded debt (reflecting a lower RPI forecast).

D99 CEPA, in its report for IAG, estimated a cost of debt of 0.08% to 0.39%. However, we consider this is likely to underestimate the efficient cost of new debt for NERL and excludes any allowance for transaction costs.

Tax uplift

D100 NERL proposes to continue the RP2 approach of applying a pre-tax WACC, with the tax uplift applied to the cost of equity based on the effective tax rate actually paid, rather than a notional corporation tax rate. We consider this approach is reasonable as it protects users by ensuring that they share in gains from NERL minimising its tax costs.

D101 In its RP3 business plan, NERL included a tax uplift of 12.7% in the pre-tax WACC. This is based on the current headline corporation tax rate of 19% but also takes account of research and development tax credits and allowances for airspace design capex in reducing NERL's tax cost.

D102 As part of its RP3 business plan, NERL provided a model to estimate the necessary tax uplift to meet NERL's estimated tax cost. We have used this tax model, as applied to these draft proposals, to estimate a lower **tax uplift of 11.7%**. We use this uplift in the draft proposals to inform our overall WACC estimate in these draft proposals.

D103 We asked our advisers Grant Thornton, to review the tax calculation. Grant Thornton has raised some questions around the assumptions used in the tax calculation. We will work with NERL to resolve these ahead of the final proposals.

Overall cost of capital

D104 We use the components above to estimate an **overall vanilla WACC of 2.57% (in RPI-deflated terms)** and a **pre-tax WACC of 2.84% (RPI-deflated)** for these draft proposals, with a range of 2.17% to 3.88%. This is significantly below NERL's proposed pre-tax WACC of 5.07%, particularly reflecting differences in the cost of equity. This is set out in detail in Table D.6 below.

D105 We have reviewed the vanilla WACC with the recent regulatory precedent and PwC's report for CAA on Heathrow Airport's next price control, in Table D.11. This shows that our draft proposed WACC appears to be broadly in line with recent UK regulatory precedent and so appears reasonable overall. While our draft proposals typically include a higher cost of equity reflecting higher betas (due to NERL facing demand risk, for example), this is partially offset by a lower estimate for the cost of debt (particularly reflecting the relatively high proportion of low-cost new debt that NERL expects to raise during RP3).

D106 In addition, our draft proposed vanilla WACC for RP2 is around 1.7% lower (in RPI-deflated terms) than allowed at RP2. By comparison, this is around the mid-point of the change between the allowed WACC at Q6 and PwC's advice to the

CAA on H7 (-2.2% to -1.3%) and is within the range of the changes in Ofwat's vanilla WACC from PR14 to PR19 guidance (-1.3%) and Ofgem's vanilla WACC from RIIO-T1/GD1 to its RIIO-2 consultation (-2.2% to -2.8%).

Table D.10 – CAA's draft prososals for NERL's RP3 WACC (RPI-deflated)

	CAA – RP2 allowance	NERA – low for RP3	NERA – high for RP3	NERL – business plan	CAA - Low for RP3	CAA - Central for RP3	CAA - High for RP3
Gearing	60%	60%	60%	60%	60%	60%	60%
Cost of new debt	1.75%	0.42%	0.42%	0.42%	-0.40%	0.10%	0.50%
Cost of embedded debt	2.50%	2.13%	2.13%	2.13%	2.30%	2.30%	2.30%
Proportion of new debt	20%	70%	70%	70%	70%	70%	70%
Issuance costs	0.15%	0.15%	0.15%	0.15%	0.10%	0.10%	0.10%
Pre-tax cost of debt	**2.50%**	**1.08%**	**1.08%**	**1.08%**	**0.51%**	**0.86%**	**1.14%**
Total market return	6.25%	6.50%	7.10%	6.80%	5.00%	5.40%	6.25%
Risk-free rate	0.75%	-1.10%	1.50%	0.46%	-1.50%	-1.40%	-0.90%
Asset beta	0.505	0.56	0.66	0.61	0.46	0.46	0.505
Equity beta	1.11	1.33	1.58	1.45	0.87	0.96	1.11
Debt beta	0.10	0.05	0.05	0.05	0.19	0.13	0.10
Post-tax cost of equity	**6.87%**	**8.97%**	**10.32%**	**9.65%**	**4.12%**	**5.13%**	**7.05%**
Vanilla WACC	**4.25%**	**4.24%**	**4.78%**	**4.51%**	**1.96%**	**2.57%**	**3.51%**
Tax uplift	37%			12.7%		11.7%	
Pre-tax WACC	**5.86%**			**5.07%**		**2.84%**	

Source: CAA analysis

Table D.11 – Comparisons of vanilla WACC by other UK regulators (RPI-deflated)

Regulator	Recent estimate	Comments
CAA – RP3 draft proposals	2.57% (4.25% at RP2)	Reduction of c.1.7% from RP2 to RP3
CAA – PwC's estimate for H7 'as is' (Jan-19)	2.5 – 3.4% (4.66% at Q6)	Reduction of c.1.3-2.2% since Q6 CAA's draft proposals for RP3 include a cost of equity within PwC's range but a slightly lower cost of debt, mainly reflecting a higher proportion of low cost new debt
Ofwat – PR19 guidance compared with PR14	2.4% (3.74% at PR14)	Reduction of c.1.3% since PR14 CAA's draft proposals for RP3 include a higher cost of equity than Ofwat, mainly due to higher betas reflecting demand risks, though partly offset by a lower cost of debt for CAA
Ofgem – RIIO-2 consultation	1.62% (3.8-4.4% at RIIO-T1/GD1)	Reduction of c.2.2 to 2.8% since RIIO-T1/GD1 CAA's draft proposals include a higher cost of equity, mainly due to higher betas reflecting demand risks and a slightly higher cost of debt
Ofcom – Business connectivity market review (Openreach copper)	3.21% (3.98% in Apr-16)	Reduction of c.0.8% since April-16 CAA's draft proposals include a higher cost of equity, mainly due to higher betas, but a lower cost of debt given a greater weight due to higher gearing

Source: CAA analysis of UKRN, Cost of Capital – Annual Update Report, June 2018; PwC, Estimating the cost of capital for H7 – Response to stakeholder views, January 2019; Ofgem, RIIO-2 Sector Specific Methodology Annex: Finance, December 2018; and Ofcom, Business connectivity market review, Annex 21, November 2018.

Appendix E

Service quality metrics – additional information

E1 The service quality metrics and incentives for the UK for RP3 are based on the performance measures in place for RP2. This appendix provides further detail on the calculation of the service quality metrics for the Environment and Capacity KPAs.

Environment

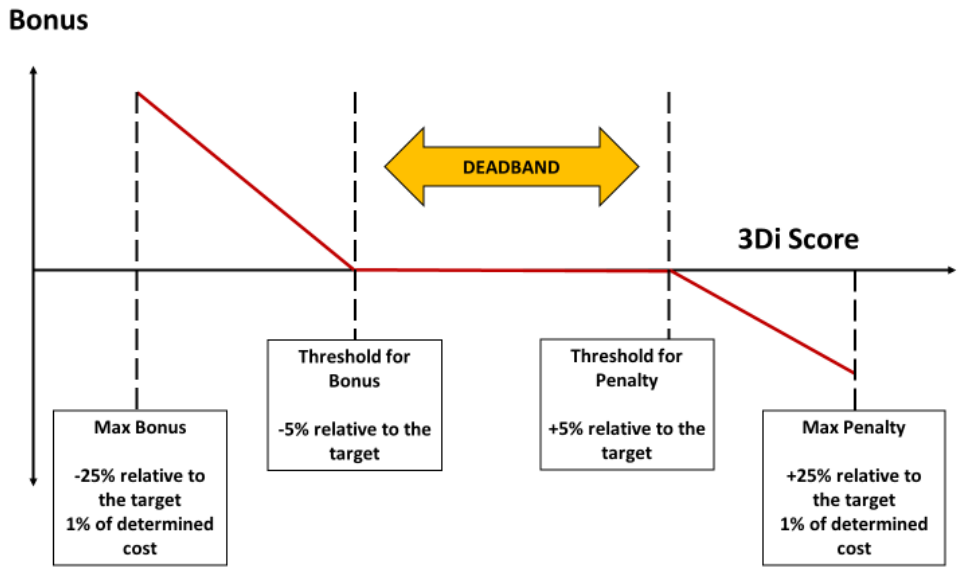
3Di incentive scheme

E2 The 3Di incentive scheme is established on the basis of the targets discussed in chapter 3. As in RP2, a deadband of ±5% is proposed for RP3 within which no bonus or penalty is triggered. Beyond the deadband, the incentive will follow a smooth sliding scale until +/-25% of the target at which point maximum financial bonus or penalty will be reached.

E3 The incentive rate is calculated evenly for each 3Di unit within the range +5% to +25% of the target (and correspondingly between -5% and -25% of the target). For example, the incentive rate for 2020 is ±0.185% of NERL's Determined Costs for each 3Di unit beyond the deadband, up to a maximum of ±1% of Determined Costs. Figure E.1 illustrates the incentive scheme for 3Di.

E4 As in RP2, the 3Di thresholds are not modulated for traffic.

Figure E.1: 3Di incentive scheme



Source: CAA

Capacity - C2

C2 incentive scheme

E5 The C2 is an adjusted and modulated metric that is used for the purpose of the mandatory incentive scheme in the capacity KPA. It is referred to as 'pivot value' in the performance regulation.

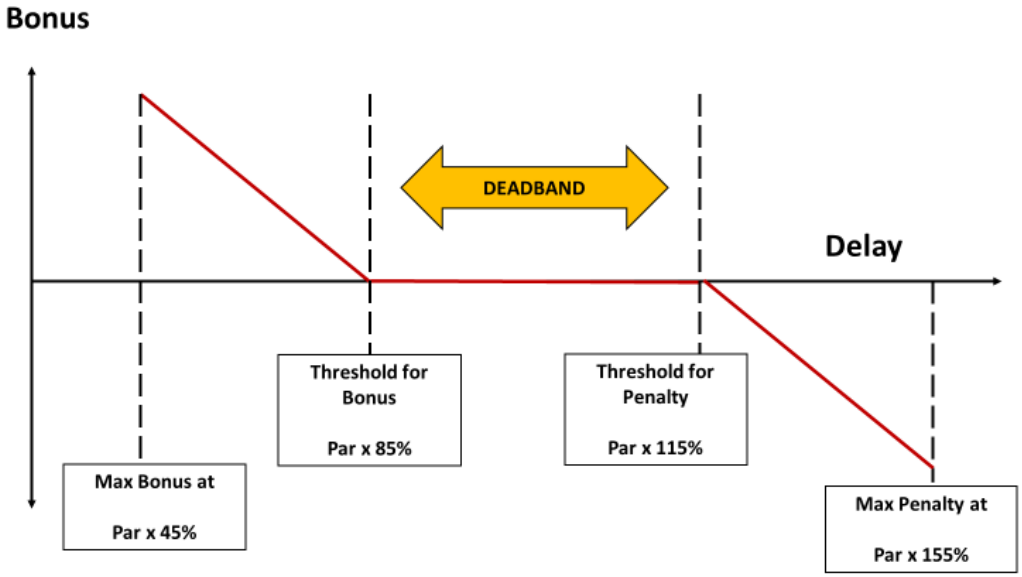
E6 As indicated in chapter 4, we intend to maintain this target at the levels targeted currently in RP2, subject to annual modulation.

E7 The performance regulation requires a symmetric 'deadband' range be applied around the C2 target, so that minor variations in ATFM delay do not lead to bonuses or penalties.

E8 In RP2, under the previous performance regulation, we set an asymmetric deadband of -20% to +10% of targeted value. For RP3 we propose that the deadband is set at ±15%. This means that NERL will earn a bonus should its performance in any year be more than 15% better than the targets set out in chapter 4 (i.e. ATFM delay of 0.15 minutes/flight[47] or lower). It would be subject to a penalty should its performance in any year be more than 15% worse than the targets set out in chapter 4 (i.e. ATFM delay of 0.21 minutes/flight or higher).

E9 As in RP2, maximum allowed bonuses or penalties would be reached if NERL's performance is outside the deadbands by an additional ±40%. The incentive will follow a sliding scale as illustrated in Figure E.2 below.

Figure E.2: C2 deadband and incentives



Source: CAA

[47] Rounded to two decimal places.

Modulation of C2

E10 The performance regulation allows for modulation of the C2 pivot values, in so far as:

- they shall be set annually by the NSA for the following year and be subject to consultation with the concerned airspace users and ANSPs;
- they shall be based on the reference value for the relevant ANSP from the November release of the Network Operations Plan in the year preceding the application of the target; and
- the modulation mechanism shall be defined in the performance plan, apply for each year of the Reference Period, and not be changed during the Reference Period.

E11 We propose to apply a 'trigger' to ensure that modulation of the C2 value reflects the expected positive relationship between traffic volume and delay.

E12 Upwards modulation would be triggered if both of the following conditions are met:

a. in year n the actual traffic volume for the UK FIR as reported by the Network Manager is more than 4% higher than the forecast set out for year n in the final performance plan; and

b. the reference value for year n in the Network Manager's November Network Operations Plan in year n-1 is higher than the reference value for year n in the Network Manager's November 2019 Network Operations Plan.

E13 Downward modulation would be triggered if both of the following conditions are met:

a. in year n the actual traffic volume for the UK FIR as reported by the Network Manager is more than 4% lower than the forecast set out for year n in the final performance plan; and

b. the reference value for year n in the Network Manager's November Network Operations Plan in year n-1 is lower than the reference value for year n in the Network Manager's November 2019 Network Operations Plan.

E14 If the conditions for upward or downward modulation apply, the C2 value will be modulated by the ratio of:

a. the reference value for year n in the Network Manager's November NOP in year n-1; and

b. the reference value for year n in the Network Manager's November 2019 NOP.

E15 Table E.1 illustrates how modulation of C2 would work in a year in which the conditions for upward or downward modulation applies.

Table E.1: Example of modulation of the KPI

		Modulation upwards	Modulation downwards
Difference between actual and forecast traffic		> 4%	< -4%
A	UK target (codes C, R, S, T, M, P only)	0.18 (delay minutes / flight)	0.18 (delay minutes / flight)
B	Reference Value (Nov 2019)	0.23 (delay minutes / flight)	0.23 (delay minutes / flight)
C	Reference Value (Nov yean n-1)	0.25 (delay minutes / flight)	0.21 (delay minutes / flight)
D = C / B	Ratio of Reference Values	1.087	0.913
E = A x D	Modulated UK target	0.196 (delay minutes / flight)	0.164 (delay minutes / flight)

Source: CAA

Capacity - C3

Calculation of C3

E16 The C3 metric is an impact score, which places greater weight on long delays and delays in the morning and the evening peaks. The targeted levels of the C3 impact score are discussed in chapter 4. The annual impact score is calculated by weighting ATFM delays in accordance with Table E.2.

Table E.2: Weights for impact score

	Morning peak period	Evening peak period	Other times
Delay > 0 and <= 15 minutes	3	2	1
Delay > 15 and <= 30 minutes	6	3	2
Delay > 30 and <= 60 minutes	9	6	3
Delay > 60 minutes	18	9	6

Source: CAA

Notes: "Morning peak" means flights with an off-block estimated time between 0400 and 0800 UTC in Summer (April – October inclusive) and between 0500 and 0900 UTC in Winter (January – March inclusive and November-December inclusive). "Evening Peak" means flights with an off-block estimated time between 1500 and 1900 UTC in Summer (April –October inclusive) and between 1600 and 2000 UTC in Winter (January-March inclusive and November-December inclusive).

E17 The weights in Table E.2 were developed through consultation between NERL and users for a previous control period (CP3) before the performance regulation applied. It is noted that there is no consistent relationship between weights. For example:

- For morning peak: 3 x 2 = 6 x 1.5 = 9 x 2 = 18

- For evening peak: 2 x 1.5 = 3 x 2 = 6 x 1.5 = 9
- For delays of up to 15 minutes: 1 x 2 = 2 x 1.5 = 3
- For delays of between 15 and 30 minutes: 2 x 1.5 = 3 x 2 = 6

E18 Changing the weights to be consistent both across and down the table would require recalculating the threshold beyond which NERL would earn a financial bonus or penalty. At this stage it is not proposed to do so for RP3, although stakeholder views on this are welcome.

C3 incentive scheme

E19 The thresholds beyond which NERL can earn a bonus or penalty for the C3 metric are determined with reference to C2. That is:

a. the (upper) threshold above which NERL is penalised be equal to the C3 score derived from the level of the C2 target of 0.18 minutes delay per flight; and

b. to maintain consistency with RP2, the (lower) threshold below which NERL would earn a reward be set at two-thirds of the upper threshold.[48]

E20 In RP2 a ratio of 2.2 was used to covert C2 value to C3 thresholds. However, NERL's performance so far in RP2 (including its projection for 2018) point to an average ratio of 1.89. The CAA has used a ratio of 2.0 in its proposals.

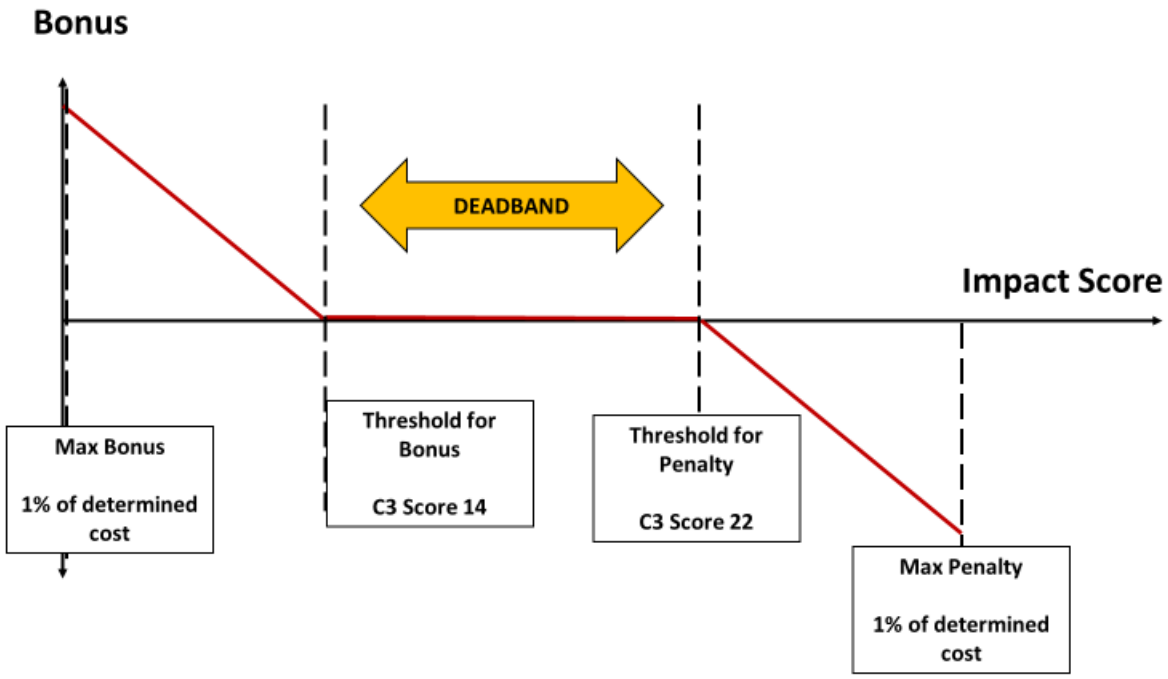
E21 The rate at which NERL's performance would affect any financial advantage or disadvantage it earns has been set such that the maximum reward of 1% of Determined Costs would be earned if the impact score is zero and the traffic is as forecast for 2020.[49] That rate is £0.168 in 2017 prices. The penalty rate is equal to the reward rate (up to a cap of -1% of Determined Costs) – i.e. -£0.168 in 2017 prices. The bonus and penalty rate will be indexed to CPI during RP3.

E22 Figure E.3 illustrates the application of the incentive.

[48] In RP2 the lower threshold was based on delay forecasts in NERL's business plan.

[49] The rate is fixed in real terms for every year of RP3 but is calibrated based on 2020 traffic.

Figure E.3: C3 incentive scheme



Source: CAA

Modulation of C3

E23 We propose to retain the approach to modulating C3 for traffic volumes that was used in RP2. If traffic is more than ±4% away from the level forecast for that year, the thresholds will be adjusted. The thresholds will be modulated by the change in traffic beyond the ±4% threshold, multiplied by an "elasticity factor" of 5.

E24 For example, if the traffic growth in a particular year is 7% higher than forecast, the thresholds will be adjusted upwards by (7%-4%) x 5 = 15%. That is, in this example, the lower threshold would increase from 14 to 16.1 and the upper threshold would increase from 22 to 25.3.

Capacity - C4

Calculation of C4

E25 The C4 metric (Daily Excess Delay Score) is based on weighted delays exceeding pre-determined thresholds on a daily basis. The targeted levels of C4 are discussed in chapter 4.

E26 C4 is calculated by weighting ATFM delay in accordance with Table E.3. Delay below the lower threshold is weighted as zero.

Table E.3: Weighting of delay to derive excess delay score - weightings

Season	Daily delay thresholds (average delay per flight)		Weighting
Winter	Lower Threshold	40 seconds	1
	Upper Threshold	80 seconds	2
Summer	Lower Threshold	60 seconds	1
	Upper Threshold	110 seconds	2

Source: CAA

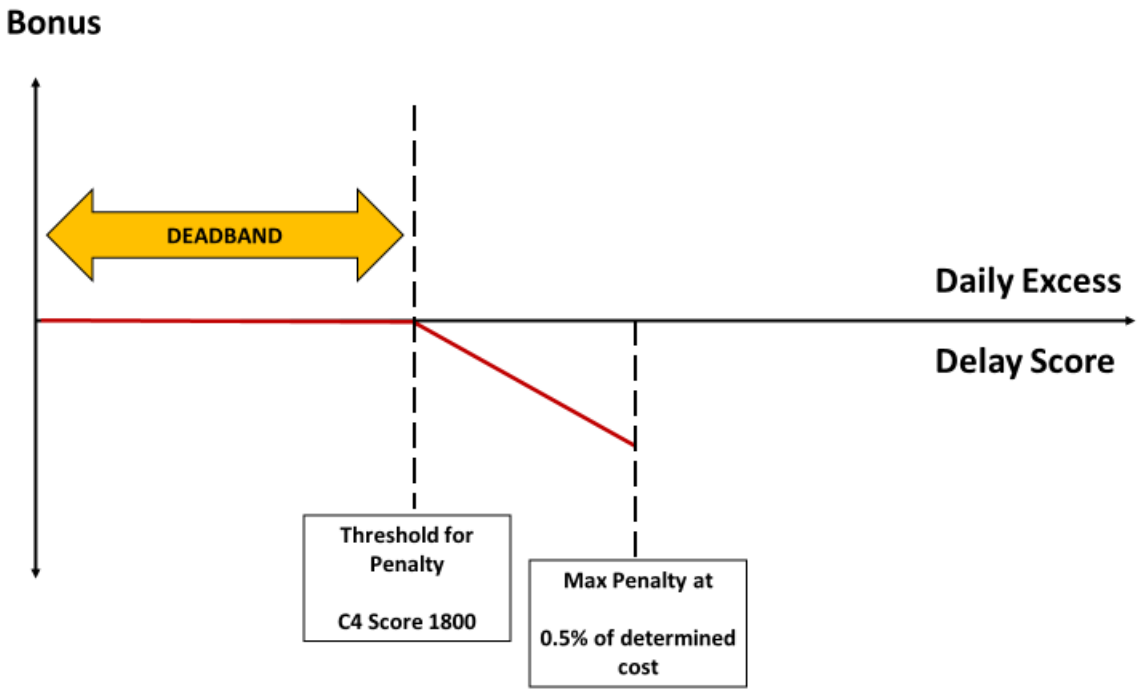
Note: Summer is April –October inclusive. Winter is January – March inclusive and November-December inclusive.

C4 incentive scheme

E27 C4 is a penalty-only incentive scheme. For RP3 we are proposing to increase the maximum penalty to 0.5% of determined costs. In order to retain a broadly similar incentive rate to RP2, the maximum penalty would be incurred if traffic is as forecast for 2020 and NERL's C4 score is 20% higher than the threshold. That rate is -£0.00327021 in 2017 prices. The penalty rate will be indexed to CPI during RP3. Figure E.4 illustrates the C4 incentives.

E28 As in RP2, the C4 threshold is not modulated for traffic volume.

Figure E.4: C4 incentive scheme



Source: CAA

Appendix F

Costs reporting tables

Table 1 - Total Costs and Unit Costs

United Kingdom
Currency : GBP £
All Entities

	Actual 2012-2017						Forecast 2018-2019		Determined - Performance Plan - Reference Period 3				
Cost details	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
1. Detail by nature (in nominal terms)													
1.1 Staff	273,294	266,644	250,904	261,862	274,115	265,678	302,280	314,594	337,301	335,989	334,494	337,737	331,370
of which, pension costs	0	0	0	0	0	0	65,324	63,760	80,418	80,680	63,307	61,841	60,785
1.2 Other operating costs	166,812	176,206	172,580	157,592	157,915	164,356	190,778	217,203	227,973	232,246	236,135	237,089	237,122
1.3 Depreciation	133,259	157,111	161,810	163,484	163,024	162,603	152,585	150,923	169,044	141,131	125,960	131,607	143,239
1.4 Cost of capital	68,586	68,484	67,470	59,072	54,881	51,587	47,418	49,174	24,508	27,551	29,579	29,773	29,670
1.5 Exceptional items	16,789	56,387	17,137	15,361	16,430	16,371	14,801	20,633	9,645	9,220	8,895	8,851	8,785
1.6 Total costs	**658,741**	**724,833**	**669,901**	**657,371**	**666,365**	**660,596**	**707,863**	**752,528**	**768,472**	**746,136**	**735,063**	**745,057**	**750,186**
Total % n/n-1		10.0%	-7.6%	-1.9%	1.4%	-0.9%	7.2%	6.3%	2.1%	-2.9%	-1.5%	1.4%	0.7%
2. Detail by service (in nominal terms)													
2.1 Air Traffic Management	475,867	529,274	483,033	477,941	482,523	475,439	614,341	656,974	666,318	642,596	628,859	633,672	636,689
2.2 Communication	44,566	48,322	44,027	43,483	43,940	43,293	0	0	0	0	0	0	0
2.3 Navigation	14,799	17,654	16,671	16,423	16,501	16,225	0	0	0	0	0	0	0
2.4 Surveillance	30,109	32,211	29,348	28,986	29,290	28,859	0	0	0	0	0	0	0
2.5 Search and rescue	0	0	0	0	0	0	0	0	0	0	0	0	0
2.6 Aeronautical Information	3,995	4,046	5,698	4,384	3,475	3,495	0	0	0	0	0	0	0
2.7 Meteorological services	29,130	28,718	28,213	28,438	27,852	26,446	26,900	26,700	30,938	30,194	31,632	35,186	35,390
2.8 Supervision costs	6,866	7,259	7,248	7,067	6,529	6,493	0	0	0	0	0	0	0
2.9 Other State costs	53,409	57,347	55,663	50,650	56,255	60,347	66,622	68,854	71,216	73,346	74,572	76,200	78,107
2.10 Total costs	**658,741**	**724,833**	**669,901**	**657,371**	**666,365**	**660,596**	**707,863**	**752,528**	**768,472**	**746,136**	**735,063**	**745,057**	**750,186**
Total % n/n-1		10.0%	-7.6%	-1.9%	1.4%	-0.9%	7.2%	6.3%	2.1%	-2.9%	-1.5%	1.4%	0.7%
3. Complementary information (in nominal terms)													
Average asset base													
3.1 Net book val. fixed assets	939,762	927,485	865,540	878,999	888,721	908,862	808,781	838,734	864,294	971,586	1,043,109	1,049,951	1,046,315
3.2 Adjustments total assets	41,682	50,556	71,695	98,161	91,589	83,411	0	0	0	0	0	0	0
3.3 Net current assets	33,018	37,497	61,439	35,862	-39,076	-107,518	0	0	0	0	0	0	0
3.4 Total asset base	1,014,462	1,015,539	998,674	1,013,022	941,234	884,755	808,781	838,734	864,294	971,586	1,043,109	1,049,951	1,046,315
Cost of capital %													
3.5 Cost of capital pre tax rate	6.76%	6.74%	6.76%	5.83%	5.83%	5.83%	5.86%	5.86%	2.84%	2.84%	2.84%	2.84%	2.84%
3.6 Return on equity													
3.7 Average interest on debts													
3.8 Share of financing through equity													
Costs of common projects													
3.9 Common projects	0.0	0.0	0.0	8,958.0	10,651.5	11,884.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Costs of new and existing investments													
3.10 Depreciation	0	0	0	0	0	0	0	0	0	0	0	0	0
3.11 Cost of capital	0	0	0	0	0	0	0	0	0	0	0	0	0
3.12 Cost of leasing	0	0	0	0	0	0	0	0	0	0	0	0	0
Eurocontrol costs													
3.13 Eurocontrol costs (Euro)													
3.14 Exchange rate (if applicable)													
3.15 Eurocontrol costs (national currency)	43,386	47,046	45,588	42,365	48,197	53,269	51,528	52,598	53,127	53,513	53,994	55,391	56,697
4. Total costs after deduction of costs for services to exempted flights (in nominal terms)													
4.1 Costs for exempted VFR flights	0	0	0	0	0	0	0	0	0	0	0	0	0
4.2 Total determined/actual costs	**658,741**	**724,833**	**669,901**	**657,371**	**666,365**	**660,596**	**707,863**	**752,528**	**768,472**	**746,136**	**735,063**	**745,057**	**750,186**
5. Cost-efficiency KPI - Determined/Actual Unit Cost (in real terms)													
5.1 Inflation %	2.80%	2.60%	1.50%	0.00%	0.70%	2.70%	2.51%	2.17%	2.00%	2.00%	2.00%	2.00%	2.00%
5.2 Inflation index (1)	92.9	95.3	96.7	96.7	97.4	100.0	102.5	104.7	106.8	109.0	111.1	113.4	115.6
5.3 Total costs real terms (2)	**709,460**	**760,858**	**692,804**	**679,846**	**684,357**	**660,596**	**690,528**	**718,508**	**719,344**	**684,742**	**661,352**	**657,200**	**648,749**
Total % n/n-1		7.2%	-8.9%	-1.9%	0.7%	-3.5%	4.5%	4.1%	0.1%	-4.8%	-3.4%	-0.6%	-1.3%
5.4 Total Service Units	**9,607.9**	**9,754.9**	**9,979.4**	**10,153.9**	**10,874.8**	**11,767.6**	**12,157.0**	**12,531.0**	**12,766.0**	**13,043.0**	**13,280.0**	**13,494.0**	**13,713.0**
Total % n/n-1		1.5%	2.3%	1.7%	7.1%	8.2%	3.3%	3.1%	1.9%	2.2%	1.8%	1.6%	1.6%
5.5 Unit cost in real terms prices (3)	**73.84**	**78.00**	**69.42**	**66.95**	**62.93**	**56.14**	**56.80**	**57.34**	**56.35**	**52.50**	**49.80**	**48.70**	**47.31**
Total % n/n-1		5.6%	-11.0%	-3.6%	-6.0%	-10.8%	1.2%	0.9%	-1.7%	-6.8%	-5.1%	-2.2%	-2.9%

Costs and asset base items in '000 - Service units in '000

(1) Inflation index - Base 100 in 2017, Forecast inflation 2018 and 2019 as per the Performance Plan.

(2) Determined costs (performance plan) and actual costs in real terms

(3) Determined unit costs (performance plan) and actual unit costs in real terms

Table 1 - Total Costs and Unit Costs

United Kingdom
Currency : GBP £
NERL

	Actual 2012-2017						Forecast 2018-2019		Determined - Performance Plan - Reference Period 3				
Cost details	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
1. Detail by nature (in nominal terms)													
1.1 Staff	255,644	249,567	234,499	244,548	257,304	249,520	275,380	287,894	306,363	305,795	302,862	302,551	295,980
of which, pension costs							65,324	63,760	80,418	80,680	63,307	61,841	60,785
1.2 Other operating costs	110,160	116,110	114,038	104,260	99,114	101,314	124,156	148,349	156,758	158,900	161,563	160,889	159,015
1.3 Depreciation	127,940	151,794	156,496	158,166	157,707	157,285	152,585	150,923	169,044	141,131	125,960	131,607	143,239
1.4 Cost of capital	68,159	68,119	67,166	56,740	52,610	49,376	47,418	49,174	24,508	27,551	29,579	29,773	29,670
1.5 Exceptional items	10,789	50,387	11,137	9,361	10,430	10,371	14,801	20,633	9,645	9,220	8,895	8,851	8,785
1.6 Total costs	**572,693**	**635,978**	**583,336**	**573,075**	**577,165**	**567,867**	**614,341**	**656,974**	**666,318**	**642,596**	**628,859**	**633,672**	**636,689**
Total % n/n-1		11.1%	-8.3%	-1.8%	0.7%	-1.6%	8.2%	6.9%	1.4%	-3.6%	-2.1%	0.8%	0.5%
2. Detail by service (in nominal terms)													
2.1 Air Traffic Management	464,435	518,179	472,117	466,289	471,184	464,250	614,341	656,974	666,318	642,596	628,859	633,672	636,689
2.2 Communication	44,566	48,322	44,027	43,483	43,940	43,293							
2.3 Navigation	14,799	17,654	16,671	16,423	16,501	16,225							
2.4 Surveillance	30,109	32,211	29,348	28,986	29,290	28,859							
2.5 Search and rescue	0	0		0	0								
2.6 Aeronautical Information	3,995	4,046	5,698	4,384	3,475	3,495							
2.7 Meteorological services	0	0		0	0								
2.8 Supervision costs	4,766	5,263	5,400	5,226	4,718	4,669							
2.9 Other State costs	10,023	10,301	10,075	8,285	8,057	7,077							
2.10 Total costs	**572,693**	**635,978**	**583,336**	**573,075**	**577,165**	**567,867**	**614,341**	**656,974**	**666,318**	**642,596**	**628,859**	**633,672**	**636,689**
Total % n/n-1		11.1%	-8.3%	-1.8%	0.7%	-1.6%	8.2%	6.9%	1.4%	-3.6%	-2.1%	0.8%	0.5%
3. Complementary information (in nominal terms)													
Average asset base													
3.1 Net book val. fixed assets	930,600	919,625	858,982	834,238	845,262	866,705	808,781	838,734	864,294	971,586	1,043,109	1,049,951	1,046,315
3.2 Adjustments total assets	41,682	50,556	71,695	98,161	91,589	83,411							
3.3 Net current assets	33,018	37,497	61,439	35,862	-39,076	-107,518							
3.4 Total asset base	1,005,300	1,007,679	992,116	968,261	897,775	842,598	**808,781**	**838,734**	**864,294**	**971,586**	**1,043,109**	**1,049,951**	**1,046,315**
Cost of capital %													
3.5 Cost of capital pre tax rate	6.78%	6.76%	6.77%	5.86%	5.86%	5.86%	5.86%	5.86%	2.84%	2.84%	2.84%	2.84%	2.84%
3.6 Return on equity	11.54%	11.54%	11.54%	10.90%	10.90%	10.90%	10.9%	10.9%	5.8%	5.8%	5.8%	5.8%	5.8%
3.7 Average interest on debts	3.58%	3.58%	3.58%	2.50%	2.50%	2.50%	2.50%	2.50%	0.86%	0.86%	0.86%	0.86%	0.86%
3.8 Share of financing through equity	40.20%	39.95%	40.08%	40.00%	40.00%	40.00%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Costs of common projects													
3.9 Common projects				8,958.0	10,651.5	11,884.7							
Costs of new and existing investments													
3.10 Depreciation													
3.11 Cost of capital													
3.12 Cost of leasing													
Eurocontrol costs													
3.13 Eurocontrol costs (Euro)													
3.14 Exchange rate (if applicable)													
3.15 Eurocontrol costs (national currency)													
4. Total costs after deduction of costs for services to exempted flights (in nominal terms)													
4.1 Costs for exempted VFR flights													
4.2 Total determined/actual costs	**572,693**	**635,978**	**583,336**	**573,075**	**577,165**	**567,867**	**614,341**	**656,974**	**666,318**	**642,596**	**628,859**	**633,672**	**636,689**
5. Cost-efficiency KPI - Determined/Actual Unit Cost (in real terms)													
5.1 Inflation %	2.80%	2.60%	1.50%	0.00%	0.70%	2.70%	2.51%	2.17%	2.00%	2.00%	2.00%	2.00%	2.00%
5.2 Inflation index (1)	92.9	95.3	96.7	96.7	97.4	100.0	102.5	104.7	106.8	109.0	111.1	113.4	115.6
5.3 Total costs real terms (2)	**616,787**	**667,587**	**603,280**	**592,668**	**592,748**	**567,867**	**599,296**	**627,274**	**623,721**	**589,721**	**565,798**	**558,949**	**550,599**
Total % n/n-1		8.2%	-9.6%	-1.8%	0.0%	-4.2%	5.5%	4.7%	-0.6%	-5.5%	-4.1%	-1.2%	-1.5%
5.4 Total Service Units	**9,607.9**	**9,754.9**	**9,979.4**	**10,153.9**	**10,874.8**	**11,767.6**	**12,157.0**	**12,531.0**	**12,766.0**	**13,043.0**	**13,280.0**	**13,494.0**	**13,713.0**
Total % n/n-1		1.5%	2.3%	1.7%	7.1%	8.2%	3.3%	3.1%	1.9%	2.2%	1.8%	1.6%	1.6%
5.5 Unit cost in real terms prices (3)	**64.20**	**68.44**	**60.45**	**58.37**	**54.51**	**48.26**	**49.30**	**50.06**	**48.86**	**45.21**	**42.61**	**41.42**	**40.15**
Total % n/n-1		6.6%	-11.7%	-3.4%	-6.6%	-11.5%	2.2%	1.5%	-2.4%	-7.5%	-5.8%	-2.8%	-3.1%

Costs and asset base items in '000 - Service units in '000
(1) Inflation index - Base 100 in 2017
(2) Determined costs (performance plan) and actual costs in real terms
(3) Determined unit costs (performance plan) and actual unit costs in real terms

Table 1 - Total Costs and Unit Costs

United Kingdom
Currency : GBP £
Met Office

	Actual 2012-2017						Forecast 2018-2019		Determined - Performance Plan - Reference Period 3				
Cost details	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
1. Detail by nature (in nominal terms)													
1.1 Staff	13,730	13,618	13,213	13,288	12,718	12,059	26,900	26,700	30,938	30,194	31,632	35,186	35,390
of which, pension costs													
1.2 Other operating costs	11,400	11,100	11,000	9,062	9,046	8,299							
1.3 Depreciation	4,000	4,000	4,000	4,000	4,000	4,000							
1.4 Cost of capital				2,088	2,088	2,088							
1.5 Exceptional items													
1.6 Total costs	**29,130**	**28,718**	**28,213**	**28,438**	**27,852**	**26,446**	**26,900**	**26,700**	**30,938**	**30,194**	**31,632**	**35,186**	**35,390**
Total % n/n-1		-1.4%	-1.8%	0.8%	-2.1%	-5.0%	1.7%	-0.7%	15.9%	-2.4%	4.8%	11.2%	0.6%
2. Detail by service (in nominal terms)													
2.1 Air Traffic Management													
2.2 Communication													
2.3 Navigation													
2.4 Surveillance													
2.5 Search and rescue													
2.6 Aeronautical Information													
2.7 Meteorological services	29,130	28,718	28,213	28,438	27,852	26,446	26,900	26,700	30,938	30,194	31,632	35,186	35,390
2.8 Supervision costs													
2.9 Other State costs													
2.10 Total costs	**29,130**	**28,718**	**28,213**	**28,438**	**27,852**	**26,446**	**26,900**	**26,700**	**30,938**	**30,194**	**31,632**	**35,186**	**35,390**
Total % n/n-1		-1.4%	-1.8%	0.8%	-2.1%	-5.0%	1.7%	-0.7%	15.9%	-2.4%	4.8%	11.2%	0.6%
3. Complementary information (in nominal terms)													
Average asset base													
3.1 Net book val. fixed assets				39,505	39,505	39,505	0	0	0	0	0	0	0
3.2 Adjustments total assets							0	0	0	0	0	0	0
3.3 Net current assets				0	0	0	0	0	0	0	0	0	0
3.4 Total asset base	0	0	0	39,505	39,505	39,505	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cost of capital %													
3.5 Cost of capital pre tax rate				5.29%	5.29%	5.29%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
3.6 Return on equity				5.30%	5.30%	5.30%							
3.7 Average interest on debts													
3.8 Share of financing through equity	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%							
Costs of common projects													
3.9 Common projects													
Costs of new and existing investments													
3.10 Depreciation													
3.11 Cost of capital													
3.12 Cost of leasing													
Eurocontrol costs													
3.13 Eurocontrol costs (Euro)													
3.14 Exchange rate (if applicable)													
3.15 Eurocontrol costs (national currency)													
4. Total costs after deduction of costs for services to exempted flights (in nominal terms)													
4.1 Costs for exempted VFR flights													
4.2 Total determined/actual costs	**29,130**	**28,718**	**28,213**	**28,438**	**27,852**	**26,446**	**26,900**	**26,700**	**30,938**	**30,194**	**31,632**	**35,186**	**35,390**
5. Cost-efficiency KPI - Determined/Actual Unit Cost (in real terms)													
5.1 Inflation %	2.80%	2.60%	1.50%	0.00%	0.70%	2.70%	2.51%	2.17%	2.00%	2.00%	2.00%	2.00%	2.00%
5.2 Inflation index (1)	92.9	95.3	96.7	96.7	97.4	100.0	102.5	104.7	106.8	109.0	111.1	113.4	115.6
5.3 Total costs real terms (2)	**31,373**	**30,145**	**29,178**	**29,410**	**28,604**	**26,446**	**26,241**	**25,493**	**28,960**	**27,709**	**28,460**	**31,037**	**30,605**
Total % n/n-1		-3.9%	-3.2%	0.8%	-2.7%	-7.5%	-0.8%	-2.9%		-4.3%	2.7%	9.1%	-1.4%
5.4 Total Service Units	**9,607.9**	**9,754.9**	**9,979.4**	**10,153.9**	**10,874.8**	**11,767.6**	**12,157.0**	**12,531.0**	**12,766.0**	**13,043.0**	**13,280.0**	**13,494.0**	**13,713.0**
Total % n/n-1		1.5%	2.3%	1.7%	7.1%	8.2%	3.3%	3.1%		2.2%	1.8%	1.6%	1.6%
5.5 Unit cost in real terms prices (3)	**3.27**	**3.09**	**2.92**	**2.90**	**2.63**	**2.25**	**2.16**	**2.03**	**2.27**	**2.12**	**2.14**	**2.30**	**2.23**
Total % n/n-1													

Costs and asset base items in '000 - Service units in '000
(1) Inflation index - Base 100 in N-3
(2) Determined costs (performance plan) and actual costs in real terms
(3) Determined unit costs (performance plan) and actual unit costs in real terms

Table 1 - Total Costs and Unit Costs

United Kingdom
Currency : GBP £
UK CAA + DfT Eurocontrol

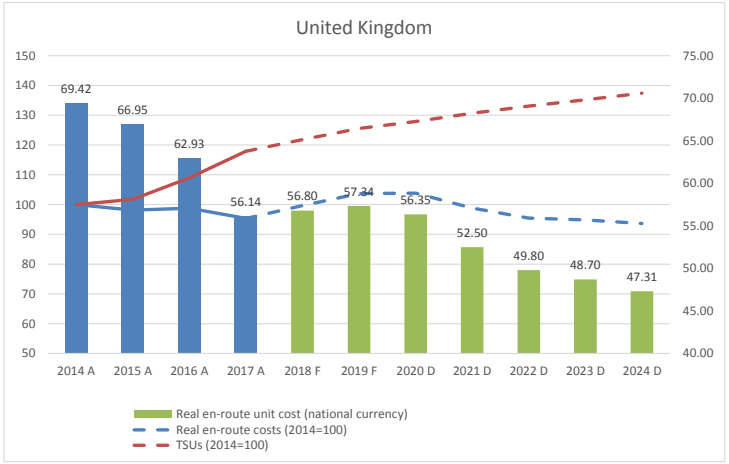
	Actual 2012-2017						Forecast 2018-2019		Determined - Performance Plan - Reference Period 3				
Cost details	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
1. Detail by nature (in nominal terms)													
1.1 Staff	3,920	3,459	3,192	4,026	4,093	4,099							
of which, pension costs													
1.2 Other operating costs	45,252	48,996	47,542	44,270	49,755	54,743	66,622	68,854	71,216	73,346	74,572	76,200	78,107
1.3 Depreciation	1,319	1,317	1,314	1,318	1,317	1,318							
1.4 Cost of capital	427	365	304	244	183	123							
1.5 Exceptional items	6,000	6,000	6,000	6,000	6,000	6,000							
1.6 Total costs	**56,918**	**60,137**	**58,352**	**55,858**	**61,348**	**66,283**	**66,622**	**68,854**	**71,216**	**73,346**	**74,572**	**76,200**	**78,107**
Total % n/n-1		5.7%	-3.0%	-4.3%	9.8%	8.0%	0.5%	3.4%	3.4%	3.0%	1.7%	2.2%	2.5%
2. Detail by service (in nominal terms)													
2.1 Air Traffic Management	11,432	11,095	10,916	11,652	11,339	11,189							
2.2 Communication													
2.3 Navigation													
2.4 Surveillance													
2.5 Search and rescue													
2.6 Aeronautical Information													
2.7 Meteorological services													
2.8 Supervision costs	2,100	1,996	1,848	1,841	1,811	1,824							
2.9 Other State costs	43,386	47,046	45,588	42,365	48,198	53,270	66,622	68,854	71,216	73,346	74,572	76,200	78,107
2.10 Total costs	**56,918**	**60,137**	**58,352**	**55,858**	**61,348**	**66,283**	**66,622**	**68,854**	**71,216**	**73,346**	**74,572**	**76,200**	**78,107**
Total % n/n-1		5.7%	-3.0%	-4.3%	9.8%	8.0%	0.5%	3.4%	3.4%	3.0%	1.7%	2.2%	2.5%
3. Complementary information (in nominal terms)													
Average asset base													
3.1 Net book val. fixed assets	9,162	7,860	6,558	5,256	3,954	2,652							
3.2 Adjustments total assets													
3.3 Net current assets													
3.4 Total asset base	9,162	7,860	6,558	5,256	3,954	2,652	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cost of capital %													
3.5 Cost of capital pre tax rate	4.66%	4.64%	4.64%	4.64%	4.64%	4.64%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
3.6 Return on equity	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%							
3.7 Average interest on debts	4.30%	4.30%	4.30%	4.30%	4.30%	4.30%							
3.8 Share of financing through equity	72.00%	69.00%	67.00%	68.00%	68.00%	68.00%							
Costs of common projects													
3.9 Common projects													
Costs of new and existing investments													
3.10 Depreciation													
3.11 Cost of capital													
3.12 Cost of leasing													
Eurocontrol costs													
3.13 Eurocontrol costs (Euro)	53,481.3	55,411.6	56,546.0	58,338.0	58,852.0	60,816.0	57,855	59,056	59,650	60,083	60,623	62,192	63,659
3.14 Exchange rate (if applicable)	0.811235	0.849020	0.806208	0.726200	0.818959	0.875911	0.890647	0.890647	0.890647	0.890647	0.890647	0.890647	0.890647
3.15 Eurocontrol costs (national currency)	43,386	47,046	45,588	42,365	48,197	53,269	51,528	52,598	53,127	53,513	53,994	55,391	56,697
4. Total costs after deduction of costs for services to exempted flights (in nominal terms)													
4.1 Costs for exempted VFR flights													
4.2 Total determined/actual costs	**56,918**	**60,137**	**58,352**	**55,858**	**61,348**	**66,283**	**66,622**	**68,854**	**71,216**	**73,346**	**74,572**	**76,200**	**78,107**
5. Cost-efficiency KPI - Determined/Actual Unit Cost (in real terms)													
5.1 Inflation %	2.80%	2.60%	1.50%	0.00%	0.70%	2.70%	2.51%	2.17%	2.00%	2.00%	2.00%	2.00%	2.00%
5.2 Inflation index (1)	92.9	95.3	96.7	96.7	97.4	100.0	102.5	104.7	106.8	109.0	111.1	113.4	115.6
5.3 Total costs real terms (2)	**61,300**	**63,126**	**60,347**	**57,768**	**63,004**	**66,283**	**64,991**	**65,741**	**66,663**	**67,311**	**67,094**	**67,214**	**67,546**
Total % n/n-1		3.0%	-4.4%	-4.3%	9.1%	5.2%	-1.9%	1.2%		1.0%	-0.3%	0.2%	0.5%
5.4 Total Service Units	**9,607.9**	**9,754.9**	**9,979.4**	**10,153.9**	**10,874.8**	**11,767.6**	**12,157.0**	**12,531.0**	**12,766.0**	**13,043.0**	**13,280.0**	**13,494.0**	**13,713.0**
Total % n/n-1		1.5%	2.3%	1.7%	7.1%	8.2%	3.3%	3.1%		2.2%	1.8%	1.6%	1.6%
5.5 Unit cost in real terms prices (3)	**6.38**	**6.47**	**6.05**	**5.69**	**5.79**	**5.63**	**5.35**	**5.25**	**5.22**	**5.16**	**5.05**	**4.98**	**4.93**
Total % n/n-1		1.4%	-6.6%	-5.9%	1.8%	-2.8%	-5.1%	-1.9%	-0.5%	-1.2%	-2.1%	-1.4%	-1.1%

Costs and asset base items in '000 - Service units in '000
(1) Inflation index - Base 100 in N-3
(2) Determined costs (performance plan) and actual costs in real terms
(3) Determined unit costs (performance plan) and actual unit costs in real terms

Cost efficiency KPI #1: Determined unit cost (DUC) for en route ANS

En route charging zone	Historical data (actual 2012-2017)						Forecast 2018-2019		RP3 Performance Plan (determined 2020-2024)					Average pct variation p.a.		
United Kingdom	**2012 A**	**2013 A**	**2014 A**	**2015 A**	**2016 A**	**2017 A**	**2018 F**	**2019 F**	**2020 D**	**2021 D**	**2022 D**	**2023 D**	**2024 D**	**2014A-2024D**	**2017A-2024D**	**2019B-2024D**
Total en route costs in nominal terms (in national currency)	658,740,665	724,832,527	669,901,156	657,371,102	666,364,998	660,595,764	707,862,786	752,528,345	768,471,749	746,136,391	735,062,563	745,057,322	750,185,840	1.1%	1.8%	-0.1%
YoY variation		*10.0%*	*-7.6%*	*-1.9%*	*1.4%*	*-0.9%*	*7.2%*	*6.3%*	*2.1%*	*-2.9%*	*-1.5%*	*1.4%*	*0.7%*			
Inflation index (Base = 100 in 2017)	93	95	97	97	97	100	103	105	107	109	111	113	116	1.8%	2.1%	2.0%
YoY variation		*2.6%*	*1.5%*	*0.0%*	*0.7%*	*2.7%*	*2.5%*	*2.2%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*			
Total en route costs in real terms (in national currency at 2017 prices)	709,459,799	760,858,033	692,804,406	679,845,962	684,356,853	660,595,764	690,528,041	718,508,164	719,343,924	684,741,616	661,351,944	657,200,439	648,749,220	-0.7%	-0.3%	-2.0%
YoY variation		*7.2%*	*-8.9%*	*-1.9%*	*0.7%*	*-3.5%*	*4.5%*	*4.1%*	*0.1%*	*-4.8%*	*-3.4%*	*-0.6%*	*-1.3%*			
Total en route Service Units (TSU)	9,607,878	9,754,933	9,979,403	10,153,900	10,874,798	11,767,621	12,157,000	12,531,000	12,766,000	13,043,000	13,280,000	13,494,000	13,713,000	3.2%	2.2%	1.8%
YoY variation		*1.5%*	*2.3%*	*1.7%*	*7.1%*	*8.2%*	*3.3%*	*3.1%*	*1.9%*	*2.2%*	*1.8%*	*1.6%*	*1.6%*			
Real en route unit costs (in national currency at 2017 prices)	**73.84**	**78.00**	**69.42**	**66.95**	**62.93**	**56.14**	**56.80**	**57.34**	**56.35**	**52.50**	**49.80**	**48.70**	**47.31**	**-3.8%**	**-2.4%**	**-3.8%**
YoY variation		*5.6%*	*-11.0%*	*-3.6%*	*-6.0%*	*-10.8%*	*1.2%*	*0.9%*	*-1.7%*	*-6.8%*	*-5.1%*	*-2.2%*	*-2.9%*			
Real en route unit costs (in EUR2017) [1]	84.30	89.05	79.26	76.44	71.85	64.09	64.85	65.46	64.33	59.94	56.86	55.60	54.01	-3.8%	-2.4%	-3.8%
YoY variation		*5.6%*	*-11.0%*	*-3.6%*	*-6.0%*	*-10.8%*	*1.2%*	*0.9%*	*-1.7%*	*-6.8%*	*-5.1%*	*-2.2%*	*-2.9%*			

[1] Average exchange rate 2017 (1 EUR=) 0.875911



Data for the graph	2014 A	2015 A	2016 A	2017 A	2018 F	2019 F	2020 D	2021 D	2022 D	2023 D	2024 D
Real en-route costs (2014=100)	100	98.1295668	98.7806727	95.3509761	99.6714274	103.710103	103.830737	98.8362097	95.4601238	94.8608919	93.6410355
TSUs (2014=100)	100	101.748572	108.972431	117.919088	121.820915	125.568634	127.923484	130.699201	133.074093	135.21851	137.41303
Real en-route unit cost (national currency)	69.42	66.95	62.93	56.14	56.80	57.34	56.35	52.50	49.80	48.70	47.31