To	Civil Aviation Authority	**Technical Note**	
From	Steer		
Date	17 October 2022		
Project	NR23 price control review	Project No.	24135901

Traffic sensitivities

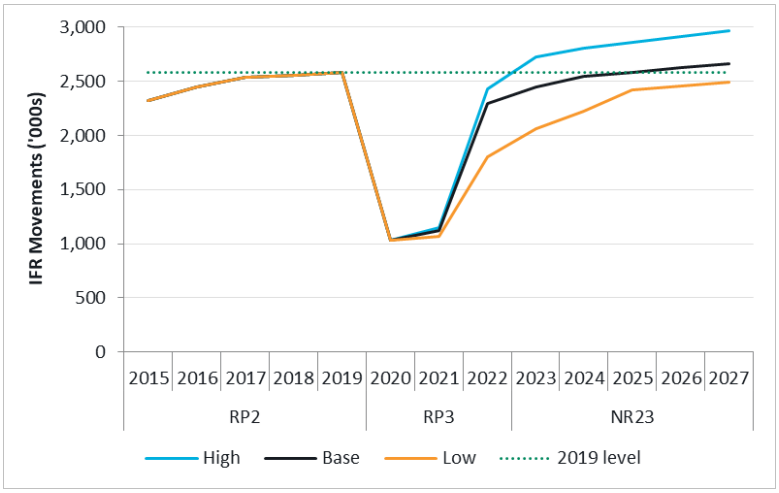
Introduction

1. This technical note presents analysis on the sensitivity of NERL's operating costs to traffic, including the results of the sensitivities run for NATS (En Route) plc's (NERL's) Business Plan (BP) using the alternative traffic scenarios specified by the Civil Aviation Authority (CAA) in July 2022.

2. The CAA is assessing NERL's operating and capital expenditure projections in preparation for the next price control period "NR23", beginning on 1 January 2023 and running for five years to the end of 2027. This assessment will inform the CAA's Initial Proposals. Steer has been supporting the CAA as part of the NR23 cost assessment, including by reviewing the NR23 BP. Steer has reported its findings in a dedicated full length report.

3. NERL has used the STATFOR October 2021 base case traffic forecast for developing its BP. Figure 1 shows STATFOR October 2021 High, Base and Low scenarios IFR movements. For the Base case, IFR movements only exceed 2019 levels in 2026.

Figure 1: STATFOR Oct 2021 traffic forecast: IFR movements



Source: STATFOR

4. As part of our review of the BP we collected a range of evidence and data, including:

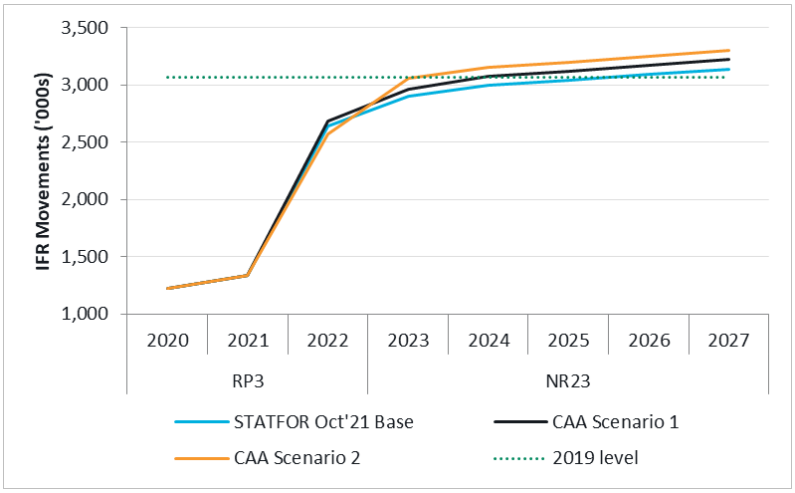
   - Review of NERL and benchmark ANSPs' historical data, examining trends, covering unit costs, productivity, and relationships between NERL cost and traffic growth and other key drivers; and
   - The development of a 'shadow operating cost model', to help fully understand the drivers of NERL's NR23 BP operating cost projections and to estimate the impact of alternative assumptions.

5. An assessment of the traffic forecast itself is not within the scope of Steer's work, however it does form a key driver for some of the operating costs. Given the time elapsed since the publication of the STATFOR Oct 2021 forecasts and the observed outturn traffic during 2022, the CAA asked Steer to consider the

variability of NERL's operating costs with traffic, including by testing the sensitivity of the NERL BP operating cost projections, as calibrated in the shadow operating cost model, to alternative traffic scenarios specified by the CAA.

6. Figure 2 shows the CAA's Scenario 1 and Scenario 2 IFR movements, alongside the STATFOR Oct'21 Base case used by NERL in its BP. For CAA Scenario 1 forecast, IFR movements exceed 2019 levels in 2023 and for CAA Scenario 2 in 2024, as compared to 2026 in the STATFOR Oct'21 base case. IFR movements in 2022 are +1.6% higher than the STATFOR Oct'21 Base case in Scenario 1, and -3.0% lower in Scenario 2. Overall, over NR23 IFR movements for CAA Scenario 1 are +2.4% higher than the STATFOR Oct'21 Base case, and +5.3% higher for CAA Scenario 2.

Figure 2: CAA July 2022 and STATFOR Oct 2021 traffic forecasts: IFR movements



Source: CAA and STATFOR

Top-down benchmarks

7. Econometric analysis of operating costs and underlying levels of traffic, both in the UK and across Europe, has attempted to establish the "elasticity" of ANSP operating costs to traffic.

8. Analysis by Steer during 2018 as part of its review of NERL's RP3 business plan, using Eurocontrol's Air Traffic Management Cost-Effectiveness (ACE) and Performance Review Report (PRR) data showed that, between 2006 and 2015 and across 31 European ANSPs, the number of operational air traffic controllers ("ATCOs in OPS") across the 31 ANSPs, had an elasticity of 0.46 to the number of composite flight hours. This parameter was highly statistically significant, with a t-statistic of 5.32 (and P-value under 0.0005). Allowing for the fact that ATCOs form only a minority of staff at ANSPs (approximately 35% including trainees). Assuming a very low elasticity to traffic volumes for other staff (e.g. 10%), then the overall elasticity to staff numbers is about half of the value found in the regression, i.e. about 0.23.

9. Further analysis by Steer in 2018[1] using ACE and PRR data showed that, between 2006 and 2015 and across 31 European ANSPs, operating costs had an elasticity of 0.32 to the number of composite flight hours. This parameter was highly statistically significant, with a t-statistic of 2.86 (and P-value of 0.005).

[1] Steer considers that the addition of more recent data to this elasticity analysis would be unlikely to produce significantly different results, given that the 2018 analysis covered a period of 10 years across 31 ANSPs and that the years 2016 to 2019, for which additional data is available, had similar characteristics in terms of steadily increasing levels of air traffic. We have therefore not reperformed the analysis.

10. The interpretation of the results is that ANSP operating costs have an elasticity to flight hours of approximately 0.3, so that a 10% increase in flight hours controlled would lead to a 3% increase in operating costs. This is consistent with elasticity of 0.4 observed by Eurocontrol's Performance Review Unit in the period 2003-2008[2] and that previously used by the CAA (0.3) in determining the price control for NATS[3]. The analysis underpinning these findings is based on periods of gradual growth in traffic and costs, so the results correspondingly relate to a gradual growth scenario. In theory similar elasticities might apply to a gradual traffic reduction scenario within the range of values tested, but this is unproven – while in practice downturns in traffic have generally taken the form of shocks (i.e. step changes).

11. However, a more challenging consideration is the question of the likely behaviour of operating costs in the circumstances of the COVID-19 pandemic. Whilst the econometric analysis discussed above was conducted during largely steady growth (with some decline due to the Global Financial Crisis), this is quite different to the sudden shock caused by the drastic reduction in traffic in 2020 and patchy recovery during 2021.

12. As a general principle, operating costs are more variable over longer time frames, but more fixed over the short term, reflecting the need for sufficient time to reduce costs by challenging measures such as reducing staff numbers other than by natural attrition. Therefore, it can be expected that short-term elasticities to traffic, especially during a period of decline rather than growth, will be lower than the long-term elasticities. Moreover, if traffic levels are expected to return to 2019 levels in a defined period, the capability to serve this level of activity needs to be maintained or recovered, leading to higher cost levels than justified by the levels of activity through the recovery period.

Bottom-up analysis

13. To test the sensitivity of the NERL NR23 BP operating cost assumptions, we have estimated three modelled cases using the "shadow operating cost model" we developed to support the assessment of the NERL NR23 BP. Whilst providing a relative base for sensitivity comparisons, it should be noted that the calibrated "shadow operating cost model" represents our interpretation of the NERL BP, and that the sensitivity of costs to traffic presented in this note may differ with alternative calibrations to match the initial NERL BP cost base.

14. The modelled cases included in this bottom-up analysis include the:

- **NERL-BP** – Based upon calibrated assumptions against the NERL BP;
- **CAA High cost efficiency case**; and
- **CAA Low cost efficiency case**.

15. Each modelled case has been tested using two alternative CAA-specified traffic scenarios, alongside the traffic profile included in the NERL BP submission. The latter allows for cost impacts associated with changes in modelled assumptions to be separated from changes in costs driven by changes in traffic.

16. Results from the traffic scenarios indicate an inferred operating cost elasticity to traffic between 0.21x and 0.26x over the NR23 period. The bottom-up results are broadly consistent with observations from previous top-down studies (Steer, CAA, PRU) whilst noting the differences in the time-period observed, operating costs considered (forecasted vs actual), and the considerations outlined in the previous section. The top-down and bottom-up analyses are predominantly based on medium-term (5-year) datasets. As noted in paragraph 12, during a period that covers the recovery of traffic to 2019 levels, the capability to serve this level of traffic needs to be maintained, leading to higher costs than justified by the level of

[2] Performance Scheme: Initial EU-wide Targets Proposals, Consultation Document, Produced by the EUROCONTROL Performance Review Commission upon the invitation of the European Commission DG-MOVE, 2nd August 2010. p.62 section 6.3.39

[3] NATS (En Route) plc CAA price control proposals (2011-2014), May 2010, p. 117 section 8.82

activity through the recovery period. In this context, the slightly lower elasticities resulting from the bottom-up analysis of the NR23 forecasted costs are considered reasonable. These might be expected to tend towards the slightly higher values in the future, if steady traffic growth above 2019 levels is expected to continue following the recovery (see also paragraph 18 for other relevant considerations, including "tipping points"). As noted above, the symmetrical application of these elasticities to downturns in traffic is unproven.

17. The comparative cost increases between the traffic scenarios, are largely driven by staff cost line items including an increase in the number of ATCO and TATC FTEs required, and costs associated with their employment (pensionable pay, pensions costs). Smaller cost increases are also experienced in non-staff cost areas that hold a relationship to traffic and/or total staff levels (driven by traffic). These areas include ADS-B, business support functions, and non-operational IT equipment (i.e. laptops or mobiles).

18. It is recognised that when testing the cost sensitivity to traffic, the consistent assumptions for staff productivity and role allocations may not fully reflect changes to business decisions that might be made in practice. This may include opportunities to achieve further economies of scale through staff training, cost per head of employee benefit schemes, and or employee support services, as overall FTEs increase. Conversely, no assumptions have been made surrounding NERL's ability to attract and train the additional FTEs required to serve the modelled increase in traffic vs the BP, or the "tipping points" in which additional working positions and or facilities may be required.

Summary

19. Results from the bottom-up analysis are broadly consistent with previous studies by Steer, CAA, and PRU for the two alternative traffic scenarios specified by the CAA. The average inferred operating cost elasticity to traffic was estimated at 0.23x, across the NERL BP, CAA High and CAA Low cost efficiency cases (see Figure 3).

Figure 3: Traffic sensitivities alongside previous studies

Source: Steer Analysis

20. This analysis provides a relative view of the sensitivity of NERLs operating cost base, based on the previous calibration of the "shadow operating cost model" developed to support the assessment of the NERL BP.