Service Delivery in 2020-21 and Business Plan 2022-24

prepared by the Irish Aviation Authority's Air Navigation Service Provider covering both En Route and Terminal Services 2020-2024

IAA ANSP RP3 Business Plan

15 July 2021

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Foreword

by Peter Kearney, CEO

This revised Business Plan for RP3 is prepared against the backdrop of a devastating global pandemic and at a time of unprecedented uncertainty for the aviation industry. As vaccines were developed in record timing, there was cautious optimism towards the end of 2020 regarding a return to the skies in summer and some consensus regarding a multi-year recovery in air travel, albeit with risks remaining skewed to the downside. We subsequently witnessed the devastating effects of the new variants and tighter travel restrictions at the beginning of 2021, with the situation compounded by delays with international vaccine deployment programmes.

The extraordinary sequence of events since the original RP3 Plans was prepared in 2019 has led to a situation whereby we have already come through the first 18 months of RP3 without an approved RP3 Business Plan. Since March 2020, our business has been in crisis management mode given the epidemiological situation that has confronted us and the associated challenges in guaranteeing a service to our customers on a 24/7 basis. The unwavering commitment from our staff ensured that our reliable service continued throughout with 131,500 terminal movements and 154,000 overflights handled in 2020. We also made considerable progress on capital projects in 2020 that will be relied on by our customers in the years ahead.

Despite the record decline in traffic, society had a particular reliance on air travel since the onset of the pandemic and I am very proud of our employees, and the wider aviation community, which continues to play a vital role in facilitating the movement of medical equipment, essential goods, repatriations and vaccines.

We will endeavour to ensure that the traffic that we are presented with in 2021 will continue to receive an excellent service but it has become clear that a meaningful recovery in international travel is unlikely to commence this year. Notwithstanding the suppressed levels of traffic at this time, it is imperative that our business is prepared to facilitate the recovery that will begin in earnest from 2022. This reality forms the cornerstone of our revised RP3 Plan.

I am pleased to confirm that we could extend financial relief to all our customers by deferring charges incurred over the period February-May 2020. In addition to this, the ANSP charges for the 2020-21 period have been set at a level that is considerably below the costs incurred.

Along with most of the aviation value chain, our business is experiencing a severe liquidity crisis due to the severity of the downturn, which has been eased somewhat by the implementation of a phased cost containment programme – this will remain in place until January 2022 and is subject to ongoing review. I am nonetheless confident that IAA ANSP can emerge from this crisis with charges that continue to be amongst the lowest in Europe – this Plan ensures the ANSP component of the unit rate remains below €25 by 2024.

Given our status of a regulated entity under the European Performance and Charging Scheme, there was a very significant development in November 2020 when a revised RP3 Regulation was published by the European Commission following the approval of European Member States. Through close cooperation and engagement with the Irish National Supervisory Authorities, we continue to make every effort to meet the requirements of the relevant regulations and I am very confident that this Plan for the ANSP is sufficiently robust to meet the future needs of the business and our customers, while also ensuring that the Performance Plan for Ireland can be approved by the European Commission before March 2022.

It must be emphasised that our ability to continue to provide the service that our current and future customers require and expect is dependent on an ANSP Plan that is consistent with the regulatory treatment of European ANSPs, reflected by the Union Wide targets developed by the Performance Review Body and approved by Member States at the Single Sky Committee in April 2021.

There will undoubtedly be many challenges to overcome in a post pandemic world, but it is reassuring that the Director General of DG MOVE, Mr. Henrik Hololei, is acutely aware of the vital role played by European ANSPs having expressed the need to ensure ANSPs get the necessary financial resources to get through the downturn, keeping the services required at this time, and having the ability to respond once the demand comes back.

Peter Kearney

Peter Kearney
Chief Executive

Executive Summary

The need for a robust revised RP3 Business Plan

Under the Chicago convention, States ensure the provision of ANS services to air traffic within and transiting through their State. Under statute, the Irish State has delegated responsibility for the provision of a safe, high quality service to the Irish Aviation Authority's Air Navigation Service Provider (IAA ANSP). IAA ANSP has continued to provide a vital service to its customers throughout the pandemic to date on behalf of the State. In that time, we have ensured a safe and efficient service for all of the traffic that we have been presented with since the beginning of 2020 and we continue to strive to meet the needs of our customers.

The period of time that has elapsed since the original RP3 Business Plan was prepared in 2019 has seen record declines in traffic as a result of the pandemic, a comprehensive phased cost containment programme rolled out in IAA ANSP and a revised RP3 regulation. On foot of this, there is a requirement to identify the business needs of IAA ANSP in conjunction with revised targets for the key performance areas of the Performance & Charging Scheme. It is of critical importance that this revised RP3 review by the National Supervisory Authorities (NSAs) does not compromise safety by disallowing the relevant cost requirements that have been identified in this Plan.

The situation presents many challenges for the industry but stakeholders agree on the importance of avoiding business or regulatory decisions that are short-sighted in nature and which would limit the ability of an ANSP to meet acceptable performance standards over the RP3 period and thereafter. It is quite simply not possible to plan on the basis of a full recovery taking place in the final year of RP3 in accordance with the recommended Scenario 2 from May 2021, while simultaneously meeting customer expectations by guaranteeing that we can effectively cater for traffic surges during the recovery. Accordingly, this Business Plan has identified requirements in terms of resources, training needs, capital projects and other cost requirements and sets out the likely consequences in relation to our performance in capacity and environment should these requirements not be recognised.

Preparing a Regulatory Business Plan at a time of great uncertainty

This Business Plan has been developed in a transparent manner, consistent with the relevant Regulations, and adheres to the guidelines and expectations set by the two NSAs. It focuses solely on eligible costs for both terminal and en route services and seeks to justify these costs on a forward-looking basis. Additional evidence is provided in the detailed appendices and IAA ANSP has been regularly responding to information requests from the NSAs over the past 18 months. This Business Plan has been prepared in a comprehensive and timely manner that provides the NSAs with sufficient time to review the Plan ahead of consultation with stakeholders and in parallel IAA ANSP has had extensive engagement with key stakeholders including the NSAs and airspace users.

By the very nature of Regulatory Business Plans, it might not be possible to achieve consensus on every aspect of this Plan, but IAA ANSP is nonetheless requesting that there is consistency with other European ANSPs. IAA ANSP also requests that the NSAs and airspace users have regard for the relative efficiencies already in place in order to ensure Ireland's service delivery is not compromised – recent statements from DG MOVE are also of relevance, which have focussed on the need to ensure that ANSPs have the necessary resources to support the recovery. On 23 March, EUROCONTROL summarised the challenges that the current situation creates for ANSPs and stated that it is important to make sure that the cost containment

measures currently planned or already implemented will not jeopardise the deployment of future capacity when traffic bounces back.

This revised RP3 Business Plan details the overall requirements of IAA ANSP for the provision of en route and terminal services over the period 2020-2024. It has been prepared during the first half of 2021 at a time of significant uncertainty in relation to the relevant Union-wide targets for the Key Performance Areas under the Performance and Charging Scheme, which were approved in May and published on 2 June. It was originally prepared on the basis of a traffic scenario from November 2020 but updated to reflect more recent forecasts published in May 2021, which are considerably more optimistic despite the sharper than expected deterioration in traffic at the beginning of this year. This approach is consistent with the European Commission's Statement at the Single Sky Committee meeting in March (SSC78), which noted that it will consider any significant change in traffic assumptions between Scenario 2 from November 2020 and the traffic forecast expected in May 2021, which is due to constitute the basis for the revision of RP3 local performance targets. The situation is further complicated by correspondence issued by the European Commission on 5 July whereby it indicated that the updated traffic forecasts due in October should be consulted upon by NSAs via sensitivity analyses.

To illustrate the magnitude of uncertainty facing stakeholders at this critical time of preparing RP3 Plans, the European Commission's Draft Implementing Decision on RP3 was published on 1 March and states that substantial uncertainty remains as to the pace and intensity of the recovery which are contingent on the evolution of the sanitary and economic situation in the Union and the rest of the world. A number of weeks later and following extensive consultation, the relevant authorities in the UK decided that it is prudent to take more time to set a price control starting in 2023 (compared to 2022 across Europe) as there should be better information about the likely path of traffic volumes and costs. Nonetheless, IAA ANSP is determined to work towards the timelines set by the European Commission that requires State Plans to be submitted by 1 October. This in turn implied that the NSAs in Ireland have required a number of months to review this Business Plan before consultation, and IAA ANSP is committed to adhering to CAR's 'Work Plan to Establish an Irish Performance Plan Containing Revised Targets for RP3', which was published on 11 December following a public consultation.

Since the draft plan was prepared in April, the level of change and uncertainty that was emphasised in that plan remains, and indeed there has been further uncertainty in a range of areas, including:

- A reopening plan in Ireland and internationally, and an ongoing discussion about how it will work
- New traffic forecasts
- Delta variant
- Delayed reopening of some sectors of the Irish economy and uncertainty around the pace of re-opening in the UK and across Europe
- No indication of US–Europe or US–UK bi-lateral agreements on opening a corridor
- HSE cyber-attack and need for all service providers to focus on cyber security
- Continued uncertainty on restructuring
- The potential for aviation taxes to be considered in the coming years
- Critical entities directive: We are assessing its implications on IAA ANSP, but it has not been possible to estimate the additional cost pressures that will be placed on IAA ANSP as a result of this initiative that is proceeding during RP3

Customer Focus

IAA ANSP continues to engage extensively with our customers across a range of domains and to act in the best interest of customers at all times. The results of the 2019 independent survey show that the overall level of Customer satisfaction with the IAA is 90.2%. This performance reflects the IAA's consistently low user charges, lack of delay, highly efficient airspace and high levels of Customer engagement. For the year before the pandemic, our customers ranked *Low Delay* and *Operational Resilience* as their first and second highest priorities respectively. This is a stark reminder of the relative importance that will be attached to these metrics when traffic recovers and why this should not be compromised by achieving unsustainable cuts to expenditure requirements that have been identified.

One year on, there were some notable changes in the feedback from our customers in relation to 2020. 'Low charges' was reported as being the number one priority of our customers followed by 'low delays' in second place whereas operational resilience had fallen to fourth. The overall level of customer satisfaction remained high at 87.1% and the majority of respondents said that cost containment should not result in the IAA ANSP having insufficient ATCOs to provide enough capacity to avoid delays when the traffic returned post the COVID-19 downturn.

Since the onset of the pandemic, IAA ANSP has demonstrated that it continues to act in the interest of its customers, having:

1) Implemented a phased cost containment programme, with payroll reduction measures introduced in July 2020 and a subsequent phase whereby payroll reduction measures would continue from January 2021-January 2022
2) Deferring en route charges incurred over the period February-May 2020 with this extended to terminal and NAC activity
3) Commitment to return all unspent capital expenditure from RP2, despite not being required to do so by the Regulation – we are unaware of any other ANSP who has made such a commitment

Having already had one of the lowest en route unit charges in Europe, these measures clearly demonstrate our commitment to customer care, while in parallel the IAA has maintained a full, safe and high-quality service to all air traffic that has been operating. Similarly, the expectations of airspace users are driving this Business Plan which has been designed to ensure IAA ANSP can continue to meet the safety and performance requirements on a sustainable basis throughout RP3, recover from the devastating impacts of the pandemic on the IAA's business and in anticipation of the requirements and challenges of the RP4 period. Our customer priorities, ranging from low user charges to low delays and operational resilience have been factored into the requirements for delivering our services on a daily basis over the next 3-4 years. In addition to this, the regulatory requirements brought about by the implementation of Regulation 373/2017 since 2020 has increased significantly. While this is a driver of cost, the benefits of the Regulation in terms of system wide compliance and safety management are recognised.

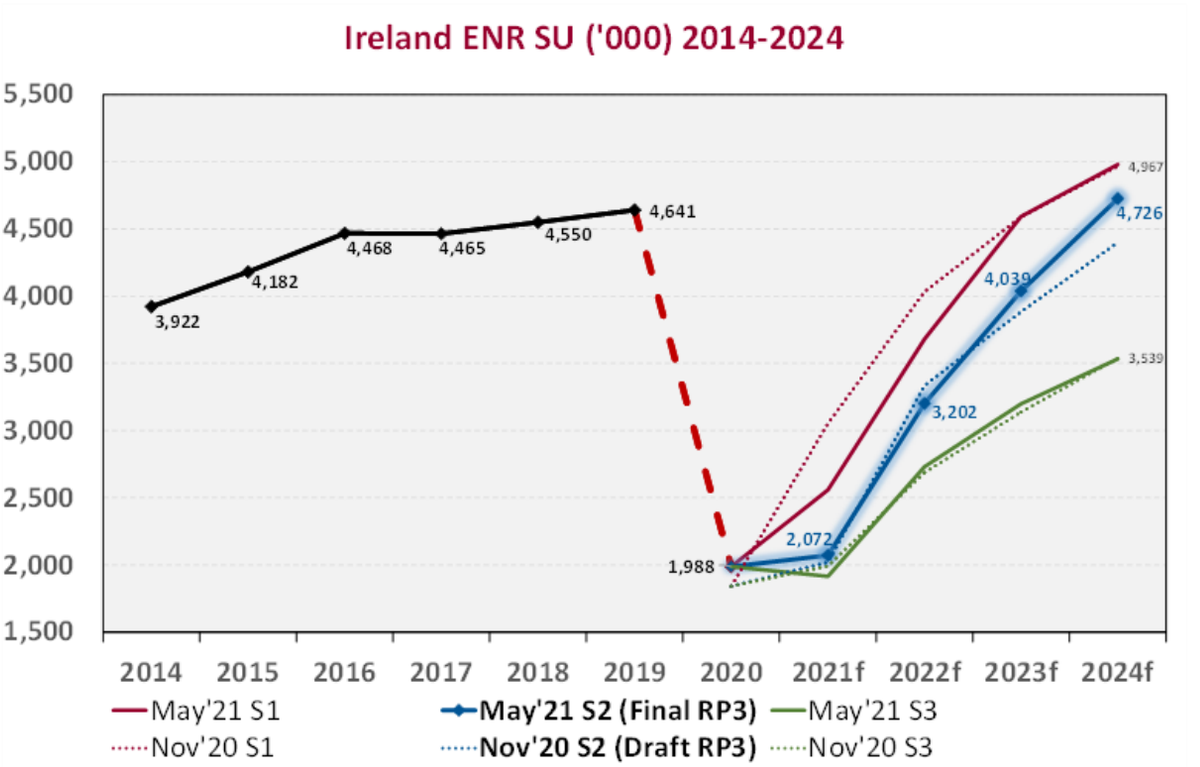
IAA ANSP has the second lowest en route unit rate in 2021 of the 27 charging zones presented in this Business Plan and the rate of €27.58 is 43% lower than the average unit rate. We also offer a very competitive terminal charge, which is currently €162.45, although this is not as easily compared to other jurisdictions as the respective cost bases in Europe are covered by ATM charges, airport charges and passenger charges to varying degrees. This highlights that the IAA ANSP is already operating at the "efficiency frontier" as we enter the RP3 period. There are however unavoidable cost drivers and commercial realities required to maintain this efficient and high-quality service for the remainder of RP3 and in preparation for RP4.

Sustainability

This revised Business Plan has been designed to ensure IAA ANSP can prioritise sustainability and continue to play its role in meeting the climate change crisis. We are conscious of the significance of this matter and the fact that the climate crisis is a priority for Government and the European Commission. In this context, sustainability is a priority for IAA ANSP also. We have recently developed our Sustainability Management Plan which is being implemented. This plan involves a number of Capex and Opex investments in energy efficiency, waste and water management, environmental awareness and carbon emissions reduction. The IAA ANSP is already a strong performer in this area, having recorded a 41% energy efficiency improvement by 2020, compared to the SEAI target of 33%. However, IAA ANSP and the wider aviation industry must, like all industries seek to do more to meet the climate challenge. Accordingly, we are prioritising this over the course of RP3, in line with Government and wider European policy.

Traffic Outlook and Resources are required to cater for peak daily traffic flows during RP3

Projected En Route Service Units



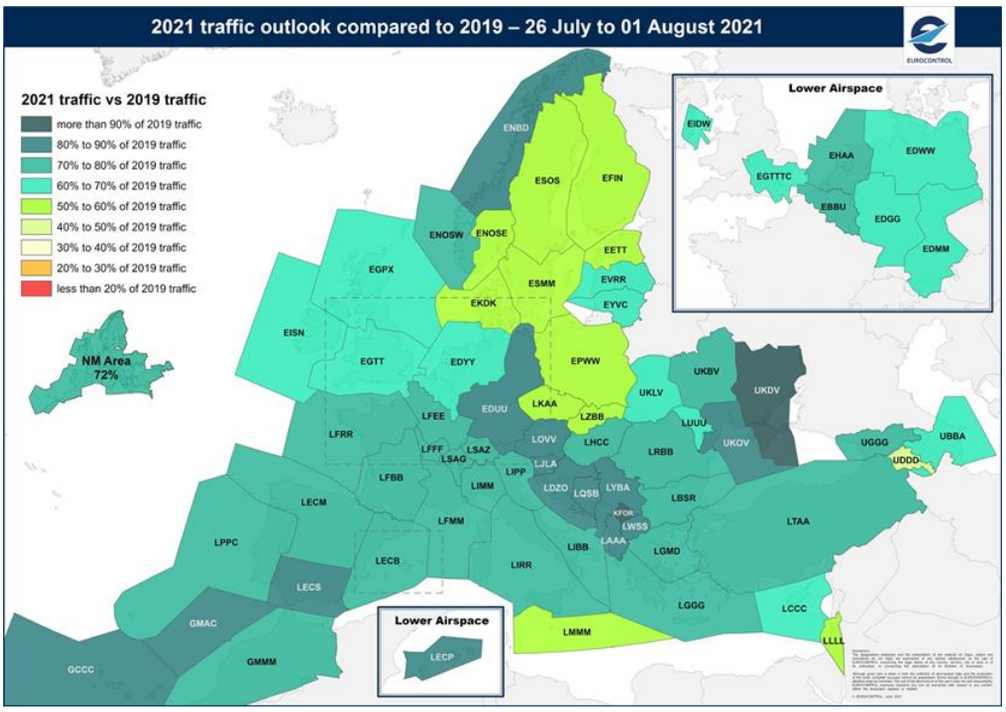
- Service Units will be 31% below 2019 levels in 2022, 13% below 2019 in 2023 before recovering (+2%) in 2024, according to the baseline Scenario 2
- The scenarios in 2024 compared to 2019 range from -24% to +7.0%. The base case Scenario 2 (+1.8%) is particularly close to Scenario 1. (86% of range v midpoint at 50%). Irish ENR traffic exceeds 2019 levels (which was a record high) by end 2024
- The equivalent range in Europe (RP2 Region) is -28% to +8%. The base case Scenario 2 is -4% (66% of range v midpoint at 50%)

In normal years 55% of all traffic in Irish airspace is transatlantic East <> West overflights. These flights are controlled by Shannon Air Traffic Control Centre. This traffic flow is expected to recover more quickly than terminal traffic and initial indications are that this trend is reflected in current traffic numbers. In relation to East <> West transatlantic traffic routes via Shannon, Brest or Scottish air traffic control centres, on average 90% of this traffic passes through Irish airspace as flights follow optimum oceanic routes. This percentage is quite volatile, and it is not unusual for almost 100% of the flights to pass through Irish airspace. The exact track system in use each day is not known with certainty until the day before the flight. However, staffing must be in place to cater for the peak traffic flow on a daily basis.

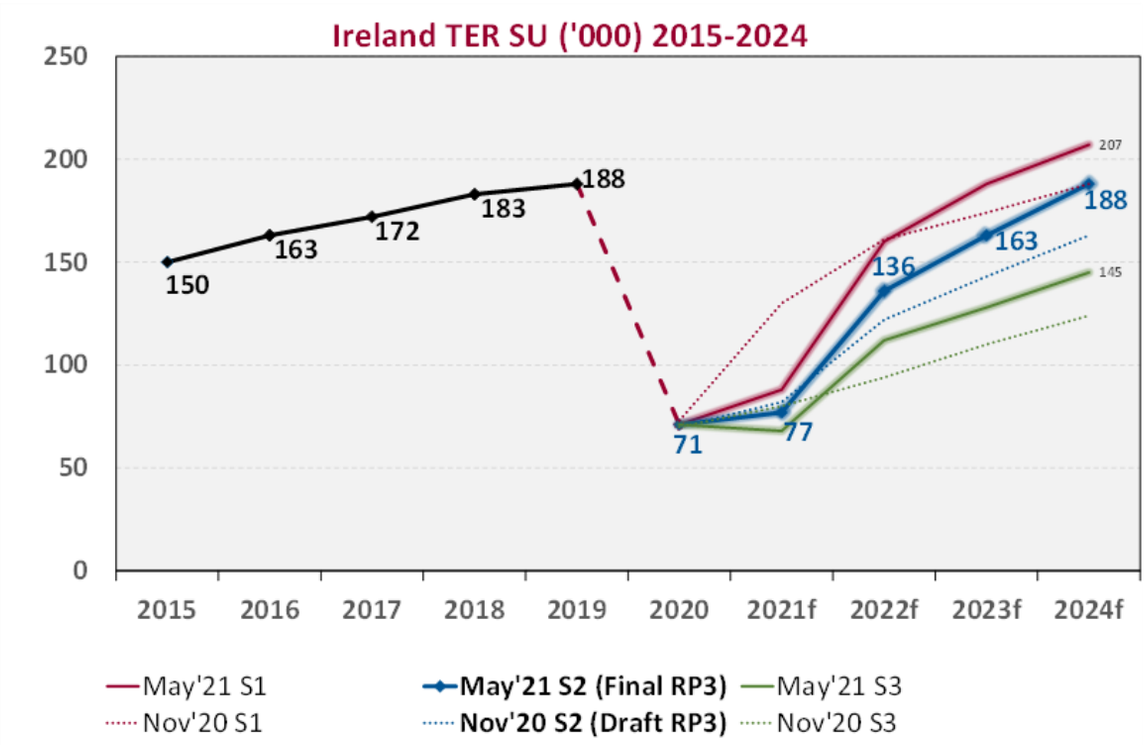
In support of planning by IAA ANSP, the Network Manager provides weekly updates through the Network Manager Rolling Seasonal Plan with the latest traffic outlook for a six-week period to be used in the capacity planning activities to ensure expected traffic demand can be handled in a safe, efficient and coordinated manner.

From European Network Operations Plan (NOP) Outlook 21 June – 01 August 2021

The Network Manager outlook states that EISN FIR will experience 60% to 70% of 2019 traffic, the Network Manager recommends a 10% buffer be applied in all cases.



Projected Terminal Service Units



- Service Units will be 28% below 2019 levels in 2022, 13% below 2019 in 2023 before recovering in 2024, according to the baseline Scenario 2

- Scenario 2 (May 2021) is 15.3% higher in 2024 compared to the equivalent scenario 2 in November 2020. It indicates that Irish TMA traffic will have returned to 2019 levels by end 2024.

- Under Scenario 1, terminal service units would be 10% more than 2019 levels by 2024 whereas Scenario 3 would see traffic levels 22.9% lower than 2019.

Dublin airport is a "fully coordinated airport", which means that demand can exceed capacity for significant periods of the day and an airport slot allocation system is required. During the second half of RP2 almost no additional slots could be allocated during peak periods of each day and additional traffic could only be accommodated in off peak periods. The traditional traffic pattern (early morning departure peak, mid-day arrival and departure peak, evening arrival peak) is expected to return well in advance of a full traffic recovery. Whereas the new runway and tower will facilitate a more efficient operation, appropriate ATC staffing will be required on a daily basis during these peak periods.

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IAA ANSP Staffing Requirement during the Pandemic

Full air traffic control services must be provided on a 24-hour basis in all Irish controlled airspace irrespective of actual traffic levels. Flight information services must similarly be provided outside controlled airspace. The three state airports are all open to operations on a 24-hour basis and a full air traffic control service must be available. Mandatory safety and security requirements dictate that some ATCO supervisory positions must be open irrespective of traffic levels. Therefore, as with other essential services there is a very significant proportion of staffing that must be provided irrespective of the traffic level. There is a very significant difference between the skill set, qualifications and equipment of enroute, approach and control tower ATCOs. Local geographical considerations also vary greatly between airports. Whereas IAA has maximised multiple ATCO ratings and roster flexibility, there are limits to these. A very significant proportion of ATCO staffing is related to the requirement to provide our air traffic control services rather than the volume of traffic.

Headcount Requirements in RP3[1]

	2019 A	2020 A	2021 F	2022 F	2023 F	2024 F
ATCOs	309	301	291	300	311	328
Engineers	72	73	84	90	93	94
Data Assistants	39	39	38	38	38	38
Ops Mgmt. & Support	60	60	64	68	69	69
Corporate Services	68	66	65	57	57	57
Total	548	539	542	553	568	586

Air Traffic Controllers required during RP3

In 2019 the terminal and en route services provided by IAA ANSP was delivered with an average of 309 air traffic controllers and the relevant projections from May indicate that IFR movements in Irish controlled airspace will exceed 2019 levels by the end of this RP3 period. On this basis, this Business Plan has identified the need for 328 air traffic controllers in the final year before RP4 to deliver a similar level of performance compared to 2019 in addition to providing 18-hour parallel runway operations at Dublin and ensuring there is a sufficient level of resources devoted to safety and regulatory compliance activities.

This Business Plan demonstrates that if the cost allowances provided for in this plan are available, IAA ANSP will continue to provide a safe, low cost, low delay, environmentally conscious, customer focussed and resilient service. However, a failure to reach our planned ATCO numbers in 2024 will result in a combination of the following:

a) delays on the ground at European airports
b) limits to the hours of parallel runway operations at Dublin Airport
c) routing restrictions within Irish controlled airspace
d) rerouting around Irish controlled airspace [e.g. via Scotland]
e) increased fuel consumption and associated cost due to more inefficient and longer routings
f) increased time in adjacent airspace subject to adjacent ANSP ENR User Charges
g) possible limits on the number of tracks in Irish controlled airspace [aircraft less likely to get optimum flight levels on tracks when there are less tracks available]

[1] Headcount figures are as at 31 December. Corporate services and Ops/Mgt Support headcount are stated at 100% but a portion of their time may be attributable to non-regulated activities – this is reflected in the allocation of staff costs.

h) inability to meet the IAA SP RP3 capacity targets
i) adverse impact on the overall European network RP3 capacity target of 0.5 min
j) inability to meet the IAA SP environmental targets
k) increased overtime payments
l) increased annual leave accumulation
m) CAPEX delivery issues

This Business Plan also identifies that the effects listed above would not be limited to the RP3 period and would extend into the RP4 period as a result of the increasing retirement profile coupled with constraints on training large numbers of air traffic controllers in such a short space of time.

Capital Expenditure

This Plan is based on the assumption that we will deliver into operational use capital projects with a value of €159.3 million. The IAA charges its capital costs only when projects have been brought into operational use. While every effort has been made to specifically identify the nature of each proposed capital investment, it is proposed that the IAA will treat its capital allowance for RP3 as a total amount to be capitalised of €159.3 million rather than specific allocations to specific services/type of project.
The following table details, by service, the projected capitalisation of projects over the course of RP3:

Total Value of Capitalised Projects in RP3

	2020A €'000	2021 F €'000	2022 F €'000	2023 F €'000	2024 F €'000	RP3 €'000
Air traffic management	9,646	55,270	23,804	15,667	8,879	113,266
Communications	5,262	3,795	3,193	2,909	1,349	16,508
Surveillance	230	1,447	4,769	7,786	2,525	16,757
Navigation	411	542	3,368	2,560	2,789	9,670
ICT Separation	-	-	3,080	-	-	3,080
Total	15,549	61,054	38,214	28,922	15,542	**159,281**

En Route and Terminal Costs 2019-2024

En Route	2019	2020	2021	2022	2023	2024
Costs (Real)	92,418,000	84,689,000	89,730,000	108,246,000	113,949,000	115,062,000
Service Units	4,640,860	1,988,290	2,072,000	3,202,000	4,039,000	4,726,000
DUC	19.91	42.59	43.31	33.81	28.21	24.35
YoY Variation		114%	2%	-22%	-17%	-14%
CAGR 2019-2024						4.1%
Terminal	2019	2020	2021	2022	2023	2024
Costs (Real)	21,668,000	17,151,000	21,260,000	29,509,000	31,937,000	32,563,000
Service Units	187,709	70,511	77,000	136,000	163,000	188,000
DUC	115.43	243.24	276.11	216.98	195.93	173.21
YoY Variation		111%	14%	-21%	-10%	-12%
CAGR 2019-2024						8.5%

In summary, this Business Plan has identified the need for en route unit costs that increase by 4.1% on average per year over RP3 and terminal unit costs that increase by 8.5% on average per year over the

same period 2019-2024. We have endeavoured to pre-empt queries from stakeholders at the consultation by providing the relevant details throughout this Plan and remain available to respond to any queries that arise in relation to this RP3 Business Plan.

Continued contribution to the efficiency of the European Network

IAA ANSP plays a critical role in the wider European aviation network. Acting as the gateway between the North Atlantic and the European network, it is important for airlines to travel efficiently and without delay through Irish airspace. Accordingly, it is our objective in RP3 to continue to contribute significantly to the wider efficiency of the European network by maintaining the standards of service build up over the past number of years.

This Plan is designed to maintain these efficiencies and ensure that Ireland does not contribute to any inefficiencies on the wider network. There are a number of initiatives outlined in this plan which will contribute to the overall cross border European network efficiency. These include the inherent efficiency of the COOPANS system, the IAA's approach to multi-rating of ATCOs, which is not standard in a European context, flexible airspace sectorisation and crew-to-workload. These are all efficient management tools which are utilised by the IAA and will continue to be used and refined over the course of this plan, but which are not widely used or standard across Europe.

These initiatives indicate that the efficiencies required by the PRB from many other Member States are already in place in Ireland and so seeking further efficiencies from IAA ANSP will be counter-productive and lead to a degradation of service. Our phased cost containment programme is further indication that IAA ANSP has more than played its role to deliver the efficiencies required for the Single European sky. To emphasis these points, we highlight two statements made by the Wise Persons Group on 14 April:

- Especially because of the crisis, we emphasise that the European airspace/airspace users cannot bear another network operational crisis (as in 2018 and 2019) when traffic is back and when European citizens start traveling again for leisure, work and to see their families and friends.
- Any regression from the current Single European Sky provisions will take us a step back in achieving a fully functional, sustainable and resilient European sky.

1. Introduction

1.1 Overview and RP2 Performance

1.1 At the start of each reference period, the attention of stakeholders is rightly focussed on targets and forecasts. Everyone is looking ahead, trying to plot the most effective and sustainable path through an uncertain future.

1.2 At this time, it is also appropriate to look back and see how we arrived at this point in the context of earlier reference periods. Each stakeholder to this process, whether they be an ANSP, an NSA or an airspace user has had a unique journey through RP2. Different starting points, local factors and pan-European developments have all played their part. For good or for bad, the one certainty we can take from RP2 into RP3 is that no plan will be perfectly aligned with actual events. With the benefit of hindsight, our objectives may look optimistic or overly conservative. Of course, another fundamental truth is that this imperfect system still represents the best, most transparent route to the core objective of the Single Sky; "*to cope with sustained air traffic growth and operations under the safest, most cost- and flight- efficient and environmentally friendly conditions.*"

1.3 At the commencement of RP2, there were three broad stated aims:

- To improve and reinforce the performance scheme with binding performance targets in all four key areas (Safety, Environment, Capacity and Cost Efficiency)
- Performance planning on a FAB level
- A 'gate-to-gate' approach covering the entire chain of air navigation services

1.4 As an ANSP, the IAA engaged positively and pro-actively with all of these objectives. On a practical level, the delivery of ANS within the confines of the performance targets is the clearest, most objective, measure of success for any ANSP in the context of RP2. As we plan for RP3, we find ourselves still focussed on these four key areas, weighing interdependencies with a dramatically different economic landscape. The fact that FAB arrangements and "gate to gate" measures have faded into the background is more an indication of how priorities evolve, rather than as a failure of policy.

1.5 From an IAA perspective, in RP2 the ANSP successfully delivered performance enhancing levels of service delivery, a fact consistently validated and confirmed by the NSA and PRB throughout the period. One of the core objectives of this Plan is to ensure there is an appropriate balance of resources to ensure the continuation of this good performance. In this Plan we will expand further on this success and highlight factors that we deem relevant to our RP3 plan. At a high level the performance of the Irish ANSP to RP2 targets is summarised as follows:

Safety
Level D achieved; fully compliant with Just Culture - all RP2 targets exceeded.

Environment
Implementation of the Free Route Airspace (FRA) in Upper and Lower airspaces well before RP2 has seen the ANSP as a pioneer in this area.

Capacity
Average of 0 min/flight en route delay.

Cost Efficiency
All targets achieved with Actual Costs being lower than the Determined Costs for each year of RP2.

1.6 As evidenced by the metrics above, during RP2 the ANSP delivered a service that contributed positively to the achievement of overall European objectives. This cannot be disputed and represents a significant success. We were by no means alone in Europe in achieving these excellent levels of performance. The IAA's performance was consistently among the top performers in Europe in addition to having one of the lowest unit rates. A similar outcome across the board would have seen the industry in a much better position to meet the challenges of a post-COVID-19 world. However, this was not the case, with several ANSPs and States failing to measure up in this way.

1.7 This good performance has set a particular RP3 starting point and context for high performing ANSPs, in the same way that poor performance has placed others at a different point. For the sake of the SES vision, good performance and consistent compliance must not be punished by a rigid application of "one size fits all" regulation. Similarly, the entire Performance Scheme will be irreparably tarnished if poor performance in RP3 somehow conveys an advantage to States and ANSPs by virtue of their respective starting points. The objective therefore should be to ensure continued good performance amongst the high performing ANSPs, while focusing cost and service pressures on those States not performing to the same standards.

1.8 In the same way that every ANSP had different outcomes from RP2, each one also had to deal with a variety of factors, both common and local, that impacted upon performance in unexpected, and at times, perverse ways. The interdependent nature of the Performance scheme sometimes exacerbated this effect and contributed to the position of each ANSP at the end of the period. Some of these impacts on the Irish ANSP are set out below.

1.2 Safety

1.9 The level of ANS safety required under EU legislation must not be subject to any trade-offs under any circumstances. While safety will always be prioritised by IAA ANSP, it requires continued focus and dedication, it should never be taken for granted. Where interdependencies arose between safety and the other three KPAs (cost-efficiency, capacity and the environment), these were effectively managed during RP2 so as not to compromise the required level of safety. Safety has a cost however, and any significant additional compliance requirements need to be matched with adequate resources.

1.10 The nature of safety regulation is that investments to support compliance need to be "front loaded". The extent of these obligations was not envisaged by anyone at the start of RP2. During these years, the ANSP ensured through prioritisation and redeployment that the structures and personnel to ensure compliance were in place.

1.3 Sustainability

1.11 This RP3 Plan has been designed to ensure IAA ANSP can prioritise sustainability and continue to play its role in meeting the climate change crisis. We are conscious of the significance of this matter and the fact that the climate crisis is a priority for Government and the European Commission. In this context, sustainability is a priority for IAA ANSP also. We have recently

developed our Sustainability Management Plan which will be implemented over the course of the RP3 period.

1.12 This plan involves a number of Capex and Opex investments in energy efficiency, waste and water management, environmental awareness and carbon emissions reduction. The IAA ANSP is already a strong performer in this area, having recorded a 41% energy efficiency improvement by 2020, compared to the SEAI target of 33%. However, IAA ANSP and the wider aviation industry must, like all industries seek to do more to meet the climate challenge. Accordingly, we are prioritising this over the course of RP3, in line with Government and wider European policy. In addition, while Irish airspace is already one of the most environmentally efficient airspaces in Europe and the IAA pioneering CO2 saving initiatives such as Free Route Airspace, we are also committed to continuing to review, analyse and seek improves in environmental performance.

1.13 NewERA has been working with the Department of the Environment, Climate and Communications (DECC) and the Department of Public Expenditure and Reform (DPER) to develop a framework for the Commercial Semi-State (CSS) sector to address climate action objectives, as envisaged under Action 147 of the Climate Action Plan 2019.

1.14 A draft framework has been agreed with DECC and DPER, subject to Government approval. As one of 18 Portfolio Companies[2], the IAA ANSP will have to make a formal decision to adopt the framework once a Government decision in respect of the draft framework has been made, which is expected before the end of Q2 2021. By signing up or adopting it, the IAA ANSP would be voluntarily entering into the commitments contained with the Framework which are as follows:

1. Governance of climate action objectives
2. Emissions measurement and reduction targets
3. Measuring and valuing emissions in investment appraisals
4. Circular economy and green procurement
5. Disclosures in financial reporting

1.15 Because of their leadership role, CSS companies, including the IAA ANSP, have an important part to play in contributing towards the achievement of the Government's 2030 climate action targets set out in CAP 2019, the Programme for Government 2020 and the draft Climate action and Low Carbon Development (Amendment) Bill 2021.

1.16 ✂
1.17 ✂
1.18 ✂

SES Environment and Capacity Performance Monitoring

1.19 In general, it is the ANSP's view that environment and capacity performance monitoring and reporting associated with RP2, which is in line with the approach in other jurisdictions, remains appropriate for RP3. The ANSP understands that the lack of definition in Commission Implementing Regulation (EU) 2019/317 in respect of the NSAs' role empowers each State to implement monitoring or reporting levels different from other jurisdictions and which may be more stringent than in previous years. With this in mind, recent interactions with the NSAs

[2] A commercial company in State ownership either designated to NewERA under its legislation or NewERA provides advice on an ongoing basis to relevant Government Ministers and Departments by agreement

indicate a proposed step-change in regulatory oversight and monitoring in relation to these two KPAs, with future oversight being more formal than previous.

Effect

1.20 To satisfy this incremental regulatory oversight and the expectation to prioritise and deliver on both the Climate Action Plan 2019 and the National CSR Policy, the ANSP has determined, that on a company-wide basis, an additional 1.5FTEs are required to meet these requirements.

1.4 Traffic

1.21 Traffic across RP2 significantly exceeded all forecasts, and key decisions had to be made by the ANSP to prioritise capacity and service quality ahead of capital project delivery. Performance targets were achieved only at the expense of diverting resources from planned capital projects to core operations and by ensuring that sufficient frontline staff were available at the expense of capital investment. A range of short-term staffing solutions (overtime, leave-deferral, etc.) were key initiatives in delivering the no/low delay profile in Ireland that benefitted the entire European network. NSA analysis during RP2 highlighted that traffic increases, and other legal and regulatory demands resulted in overtime [+58%] and annual leave carry over [+44%] increasing to unsustainable levels in the period

1.22 Short-term measures such as a heavy reliance on overtime and considerable volumes of annual leave being deferred cannot be sustained beyond RP3. In addition, both national and EU staff related regulations that began implementation during RP2 will not only severely restrict the use of short-term staffing solutions but will also require additional staff to comply with requirements. When traffic recovers, as it surely will, the ANSP is certain that this high level of interdependency between capacity and cost-efficiency will continue to be a factor in RP3.

1.5 Regulation

1.23 The high achievement and progressive improvements in safety performance in Ireland have been attained during RP2 via the implementation of proportionate and focused strategies. These successful efforts, however, require additional financial investments to ensure that necessary structures and essential specialists and dedicated staff were available to achieve these levels of improvements to the SMS.

1.24 Many of the resources needed for compliance with (EU) 2017/373 have had to be put in place during RP2, “front loaded” in effect. In the short term, the necessary additional Safety Management, SMS support staff and ATM Occurrence Investigator posts were met from existing staff, through redeployment. By necessity, this cadre of staff must be very experienced, with a detailed understanding of IAA Operations. Over time, the backfilling of the operational gaps left by this redeployment was addressed, but this is not proportionately reflected in the ANSP’s actual costs over RP2. This must be addressed during RP3 to ensure a sustainable footing.

1.6 Investments

1.25 Traffic in RP2 grew much more quickly than anticipated and the ANSP had to utilise more resources than initially planned on day-to-day activity at the expense of resource allocation to project delivery. This was highlighted in the annual monitoring reports during RP2. Even allowing for the curtailed post-COVID-19 investment programme, this means that there is a heavy volume

of obsolescence projects and catch up projects for RP3. Notwithstanding these issues, there were some notable CAPEX achievements in RP2, including:

- New Control Tower construction completed in March 2019 – it was not in the RP2 Plan but had to be prioritised due to the requirement for parallel runway operations sooner than had been expected. This project is currently in the fit-out phase and will enable parallel runway operations at Dublin Airport from 2022.
- Electronic flight strips (EFS) introduced at Dublin airport
- Improved CNS capability with the introduction of a modern, server-based communications system without incurring any associated delays
- A new Operational Contingency centre substantially completed

1.26 This led to a significant CAPEX underspend in RP2. As of end 2018, there was €17.9m of capital-related costs (depreciation and cost of capital) that the IAA had not utilised since the beginning of the performance scheme. This is split between en route (€13.5m) and terminal (€4.4m). The IAA had committed to returning the unspent €17.9m to the airspace users in 2020. Capex in 2019 was also underspent, by €9.3m. As stated by CAR[3], after the Covid-19 outbreak, the ANSP decided not to return any additional unspent RP2 capex as lower unit rates in 2021. The reason for this was partly related to 2021-unit rates being held artificially low pending the revised regulation. CAR further noted that it is up to the ANSP to voluntarily return additional unspent RP2 capex as lower unit rates in future years. We confirm that we fully intend to return the unspent 2019 related capital expenditure.

1.7 Cost Efficiency

1.27 In the first instance it is laudable that the ANSP achieved the cost efficiency targets for RP2. This was delivered through prudent cost management, despite the traffic pressures. This has seen Actual Costs being lower than the Determined Costs for each year of the period. This feat, by no means a universal achievement among ANSPs, was brought about through close budgetary control, and comprehensive planning. These measures, which the ANSP has proven adept at following, will be needed now more than ever as the entire ATM community deals with the fallout from Covid-19.

1.28 That is not to say that this underspend was entirely planned or welcomed by the ANSP. As already outlined, some unanticipated factors played their part. During the period 2014 – 2019, en route traffic in Irish airspace has increased by an average of 3.4% per annum. In order to meet the significant increase in demand during this period and continue to deliver the quality of service that stakeholders expect, the IAA had to focus on core operations. Key decisions had to be made to prioritise capacity and service quality ahead of capital project delivery. Performance targets were achieved only at the expense of diverting resources from planned capital projects to core operations and by ensuring that sufficient frontline staff were available at the expense of capital investment.

1.29 The lower than planned total expenditure in RP2 does mask an unsustainable reliance on short term measures such as overtime and annual leave deferral. These upward trends experienced

3 https://www.aviationreg.ie/_fileupload/2020/Outcome%20of%20Consultation%202019actuals2021unitratesANS.pdf

over RP2 must be reversed. The link between overtime, annual leave accumulation and fatigue needs to be emphasised. This is particularly relevant with the implementation of Regulation (EU) 2017/373. The airline industry has previously encountered difficulties with rostering resulting in large scale flight cancellations and this needs to be avoided in Air Traffic Service provision.

1.30 With long lead-in times for both staffing and investments, an ANSP does not experience a linear effect with regard to resource allocation and service delivery. During RP2 the IAA ANSP's expenditure was not representative of the cost of sustainably providing the service delivered over an extended period of time. Typically, costs will play a catch-up role as activity increases quickly. As we have all seen over the last year, the opposite is also true. Notwithstanding an obligation to provide ATM services irrespective of traffic levels, the ability of ANSPs to quickly set aside costs is more limited than for other stakeholders.

1.8 Implications for RP3

1.31 The ANSP has taken all the factors from RP2 outlined above and used the information to plan a sustainable business plan for the years ahead. The events of RP2, both foreseen and unforeseen has informed our planning. Similarly, the devastating impact of COVID-19 is reflected in the proposed RP3 activity and associated resource requirements.

1.32 Good planning takes account of past performance, while not slavishly adhering to an unrealistic extrapolation of historical trends, or an inflexible reliance on current forecasts and projections. There is no perfect dataset from a finite period that can represent an ideal starting point for even one ANSP, never mind a group as diverse as exists in Europe. This truism has been reinforced by the experience of RP2 and should be at the heart of all deliberations among stakeholders in RP3.

1.9 Unavoidable costs 2020-2024

1.33 This Business Plan details our performance throughout 2020 and in the first quarter of 2021 with the traffic that we have been presented with, the broadly fixed nature of the ANS cost base and the fact that uncertainty prevailed at all times during the pandemic. Focussing solely on the so-called emergency years of 2020 and 2021, our overall resources at this point in time does not reflect high levels of dynamic efficiency due to the nature of our business model and the relatively high level of fixed costs. We have nonetheless implemented a significant phased cost containment programme since March 2020 despite a lack of guidance from a regulatory perspective and despite the numerous scenarios of a quick recovery in traffic that did not materialise.

1.34 To ensure a complete assessment of this Business Plan it is necessary to consider the range of traffic scenarios from 2020 to the present day that our business has had to be prepared for. If we look at the short term, for example, with Scenario 1 of 3 from EUROCONTROL in November 2020 which was a real possibility following the development of vaccines – we were obliged and ready to accommodate this recovery had it materialised. Looking over a more extended timeframe to 2023 or 2024, if traffic fully recovers by then, our ANSP with the implementation of this plan, will be appropriately positioned to facilitate this recovery.

1.35 Conversely, if our staffing numbers were reduced in line with traffic developments in 2020 and 2021, we would need up to two years notice in order to prepare to have an appropriate level of staff in place due to the time required to recruit and train. The same principle applies to new recruits that are required towards the end of RP3 and at the beginning of RP4 – if the business

need is not accepted, it runs the very real risk of having a suboptimal level of resources to handle traffic from 2024.

1.36 Therefore, this Business Plan contains a full and transparent list of costs that have been unavoidable since January 2020 and which will continue to be unavoidable until the end of 2024 if the desired performance in relation to capacity and environment key performance areas is to be achieved.

Further context on the unit rates

1.37 This Business Plan focuses on eligible en route and terminal costs that were required since the beginning of 2020 in addition to the projected cost requirement until the end of 2024. It also relies on Scenario 2 from November 2020 in order to estimate the relevant unit rates in 2020-21, 2022, 2023 and 2024.

- This Plan does not factor into account future revenue or adjustments that may offset the respective unit rates including, for example, future income from grants or returning the remaining balance of unspent capital expenditure from the previous reference period.

Adjustments spread over 5 years from 2022

1.38 Regulation (EU) 2020/1627 states that Regulation (EU) 2019/317 should be adapted so as to mitigate the severe adverse financial impact those mechanisms would otherwise have on airspace users as well as to avoid excessive volatility of unit rates during RP3. Accordingly, it states that the corresponding unit rate adjustments should be exceptionally spread over a time period of 5 calendar years. IAA ANSP is of the view that this timeframe is appropriate and that costs incurred in 2020-21 but not recovered at that time should be fully recovered by 2027 even though the NSAs have discretion to extend this to 2029 under the Regulation.

- When presenting the respective unit rates, this Plan does not factor into account incurred costs that are recoverable in 2023 and 2024 (i.e. from 2023).

1.39 Related to this and given the severity of the liquidity crisis that also extends to ANSPs, we propose to return the unspent capital-related expenditure pertaining to 2019 over the same five-year period to 2027.

Key Points to note from this Introductory Section
1. During RP2 the performance of IAA ANSP was consistently among the top performers in Europe in addition to having one of the lowest unit rates. It is in all stakeholders' interest that the RP3 plan provides for a continuation of this high level of service quality.
2. Safety will always be prioritised by the IAA ANSP, but it requires continued focus, dedication and resource and it should never be taken for granted.
3. IAA ANSP is committed to voluntarily returning all of the unspent Capital Expenditure from RP2
4. IAA ANSP is already a strong performer in the area of sustainability, having recorded a 41% energy efficiency improvement by 2020, compared to the SEAI target of 33%. Consistent with the objectives of Government and the European Commission, sustainability is a priority for IAA ANSP in RP3.
5. With long lead-in times for both staffing and investments, an ANSP does not experience a linear effect with regard to resource allocation and service delivery
6. This Business Plan identifies a complete list of costs that are required to ensure the required standard of service is provided as the industry recovers from the pandemic. It is also important that the RP3 plan provides for the ANSP to recover and put its business on a sustainable footing for the future.

1.10 Structure of this RP3 Business Plan

1.40 In developing this Business Plan, we have been guided by the requirements of the original RP3 Plan coupled with the updated expectations of the NSA. It only identifies costs that are eligible and seeks to justify those costs as appropriate.

1.41 **Section 2** provides a summary of the background to this Plan with a focus on the emergency years 2020 and 2021. There have been many significant developments since the original RP3 Plan was consulted with stakeholders in September 2019, including revenue returned to airspace users via lower user charges in 2021 and the charges in 2020 and 2021, which were based on pre-pandemic traffic forecasts with these emergency years now subject to a reassessment in line with the revised RP3 regulation.

1.42 **Section 3** of this Plan summarises the relevant RP3 regulatory developments from our perspective, and how they relate to the actual cost requirement included in this Plan. It describes the magnitude of uncertainty that existed throughout 2020 from a regulatory perspective in addition to uncertainty that remains following the revised RP3 regulation in November 2020. It shows that ANSPs had several weeks towards the end of 2020 to provide initial cost estimates, which was insufficient time to produce the more meaningful figures contained in this Plan. This section also describes the uncertainty that has persisted at the time of preparing this Plan including, for example, unanswered questions on whether traffic forecasts from November 2020 or May 2021 will form the basis of this revised RP3 Business Plan.

1.43 **Section 4** provides details of our engagement with our customers throughout 2020 and the uncertainty that existed as the planning horizon for many airlines reduced to a couple of weeks at times. This section also contains findings following our Customer Care Programme, including the nature of our cost containment programme, and the general sentiment from our airline customers

regarding the importance of ensuring that there is a sufficient number of frontline resources in place to cater for the recovery when it comes about in the latter years of RP3.

1.44 **Section 5** summarises the en route and terminal traffic that we have serviced since the beginning of RP3**.** It also details the traffic forecasts that this Business Plan is predicated on, as recommended by the PRB.

1.45 **Section 6** examines the key interdependencies across the four key performance areas of safety, environment, capacity and cost efficiency. It analyses the very real implications on performance should the ANSP not obtain the cost allowance identified in this Business Plan.

1.46 **Section 7** provides an extensive list of operating expenditure requirements over the period 2020-2024. It is structured to meet stakeholder expectations from a transparency perspective and all of the eligible costs that are identified are accompanied by text justifying the need.

It also summarises the ANSPs capital expenditure requirements over the period 2020-2024 across terminal and en route services. These projects are significantly reduced compared to the original RP3 Plan and focus on key areas of obsolescence, sustainability, and improved technology (COOPANS) projects. Also included in this requirement is standard property, security, and ICT needs. Further details on these individual projects are contained in the Appendices where there is a dedicated project sheet, as appropriate. Confidential Business Cases have been shared in parallel with the NSAs.

1.47 **Section 8** sets out the additional requirements being placed on IAA ANSP during RP3 in relation to Implementing Regulation 2017/373.

1.48 **Section 9** contains the conclusion to this Business Plan, which summarised unavoidable consequences on our performance over the next 3-4 years should the business needs identified in this Business Plan not be approved. This is followed by Appendices detailing our Cost Containment Programme in addition to providing further information on required capital projects across the domains of Property & Security, ICT and Technical Services.

2. Background to this revised RP3 Plan

2.1 The original Draft RP3 Plan

2.1 The original Draft RP3 Plans were prepared by European States in 2019 in line with Commission Implementing Regulation (EU) 2019/317. The five-month review period by the European Commission was set to conclude in March 2020 but it became clear to all stakeholders that the underlying assumptions in the respective European Plans were no longer fit for purpose as a result of the unfolding pandemic.

2.2 It subsequently transpired that a revised RP3 regulation was required, and it did not become available until November 2020, almost one year in to the five-year RP3 period. Furthermore, the implication of this development is that the revised RP3 Plans would not be reviewed in full following consultation with stakeholders until March 2022 – almost halfway into the RP3 period.

2.2 CAR designated as a National Supervisory Authority

2.3 From 1 January 2020, CAR was designated as a National Supervisory Authority in Ireland for economic regulation under the performance and charging schemes of the Single European Sky. The Safety Regulation Division of the IAA continues to be the NSA for all other non-economic regulatory and oversight tasks under the performance scheme.

2.4 In the months that followed CAR's designation as an NSA, there was a considerable level of engagement between CAR and IAA ANSP, particularly due to the realisation that a revised RP3 Plan would be required once the traffic outlook stabilised. This engagement has continued in 2021 between both IAA ANSP, CAR and consultants engaged by CAR and has primarily centred on IAA ANSP providing the relevant information to CAR at its request.

2.3 The absence of an RP3 Plan in 2020 and 2021

2.5 IAA ANSP entered the crisis in 2020 seeking to ensure continuity of service provision when confronted with a very severe epidemiological crisis, while also following all Government and HSE advice on protection of public health. We also initiated a phased cost containment programme in March 2020 given the potential for a liquidity crisis, which subsequently materialised. The circumstances that led to the absence of an RP3 Plan added significant complexity to the crisis, as set out paragraphs 2.6 and 1.49 below.

2.6 Charges for en route and terminal services have been set in 2020 and 2021 on the basis of the outdated draft Plans prepared in 2019. The pre-pandemic traffic forecasts that have been relied upon for charging purposes in 2020 and 2021 had the effect of greatly subduing the ANSP unit charges in the first two years of RP3 and led to a situation whereby IAA ANSP and regulated entities across Europe have been unable to recover their costs based on the subdued levels of actual traffic that materialised at that time.

1.49 The regulatory uncertainty was also a significant factor for IAA ANSP in rolling out its cost containment programme. While it was incumbent on IAA ANSP to respond to the unfolding crisis in a proportionate manner, the process surrounding the development of a revised RP3 regulation included references to actual costs in 2020 and 2021 being considered. ✂

2.7 ✂

2.8 Due to the sequencing of events in early 2020 and the significant uncertainty surrounding the timing of a recovery, more than two of the five RP3 years (2020-2021) will have passed without an approved RP3 Plan. Economic regulation is based upon a principle of regulatory certainty; to date this has not existed for the RP3 period. Indeed even as this plan is developed, there is no certainty on Union-wide performance targets for the RP3 period.

2.9 Even as we have developed this RP3 Plan, the uncertainty shows no signs of abating due to the extraordinary developments surrounding traffic so far in 2021. When preparing this Business Plan, there is no indication of when an aviation restart in Ireland can occur, all non-essential travel is banned and a number of European States are experiencing a fourth wave of COVID-19 infections. At its consultation in February, the PRB noted the following:

- If [RP3] timelines are not met this year, the plan to have adjustments flow through to 2023 will be deferred
- The whole system will be blocked with no approved plans if States/ANSPs do not sort the cost efficiency out.

2.4 Consultation by CAR on its work plan to revise RP3 Targets (CP10/2020)

2.10 CAR set out its draft workplan for RP3 in a consultation document published on 4 November 2020[4]. It sought feedback on the timeline and methodologies in its work plan by 20 November. The consultation stated that between November 2020 and September 2021, CAR propose to assess the local cost efficiency targets for Ireland's revised draft RP3 performance plan. It also acknowledged that the revised EU-wide RP3 targets would be adopted before 1 May 2021.

Position taken by IAA ANSP

2.11 IAA ANSP responded to CAR's consultation on 20 November 2020 and signalled its support for the high-level milestones set out by CAR in its consultation, given the ambitious timeframe facing all European stakeholders in 2021[5].

2.12 In responding to CAR's consultation on its proposed work plan for establishing an Irish Performance Plan containing revised targets for RP3, we expressed the view that ex post expectations on cost control measures implemented by IAA ANSP should be forthcoming before September 2021 and preferably to coincide with the availability of cost efficiency targets from Europe.

2.13 We further noted that it is important to minimise the time period subject to retroactive regulation and therefore requested that the interim results of the ongoing Operating Expenditure Review (covering the period 2020-2024) would become available earlier in 2021.

[4] https://www.aviationreg.ie/_fileupload/2020/CP10-2020%20Consultation%20on%20Work%20Plan%20for%20Revision%20of%20Targets%20of%20Draft%20Irish%20Plan%202020-2024.pdf

[5] https://www.aviationreg.ie/_fileupload/RP3/2020-11-20%20IAA%20Submission%20to%20CAR%20on%20Proposed%20RP3%20Work%20Plan.pdf

2.14 In responding to this consultation, we also referred to the position of DG MOVE in which it confirmed on a number of occasions in 2020 that there is no plan to deplete European ANSPs of resources during the pandemic. We noted the importance of ensuring that forthcoming guidance from Ireland's National Supervisory Authorities would have regard to this position.

Response from CAR to IAA ANSP

2.15 CAR published the outcome of its consultation on 11 December[6]. In relation to observations made by IAA ANSP, CAR noted the concern about minimising the time period subject to retroactive regulation but subsequently confirmed that the finalisation of the Irish Performance Plan will depend on how fast the European Commission approves it.

Workplan and methodology adopted by CAR

2.16 CAR adopted the following work plan following consultation with stakeholders. It remained unchanged following the original proposals at the beginning of November.

2.17 CAR stated that the purpose of the cost efficiency review is to define a unit cost level and trend for the ANSP rather than to specify or recommend how the ANSP should operate its business.

2.18 The reality, however, is that the ANSP is almost wholly dependent on the regulatory regime in place and a decision by CAR to define a unit cost level and trend for the ANSP over a five year period has the potential to significantly constrain the manner in which the ANSP operates its business.

Figure 1 RP3 Workplan Adopted by CAR on 11 December 2020

[6] https://www.aviationreg.ie/_fileupload/RP3/2020-12-11%20Final%20Workplan%20RP3(1).pdf

2.19 The first milestone in relation to traffic forecasts was not met due to the prevailing high levels of uncertainty in December 2020 and which continued into 2021. IAA ANSP did submit a draft report to CAR on cost containment in December, but it was not finalised until the beginning of January following the completion of a staff ballot over the holiday period. It was subsequently published on CAR's website and is contained in Appendix 4.

2.5 Consultation material in relation to IAA ANSP charges in 2021

2.20 We have been contacted by a number of customers seeking a reduction in charges in 2021, which is understandable given the depth of the crisis that we have been confronted with. However, correspondence of this nature has effectively sought to address issues that are relevant to the forthcoming consultation on the revised RP3 Plan, with CAR often included in the correspondence due to their role of National Supervisory Authority. Therefore, this section provides details on the charges that have been in place for the 2020-2021 period, including information that was provided by IAA ANSP at the stakeholder consultation in July 2020[7].

2.21 The charges in place in 2020 and 2021 across Europe have been based on the Draft RP3 Plans prepared mid-2019 and consulted with stakeholders in September 2019. Critically from an ANSP perspective, these draft plans were based on pre-pandemic traffic forecasts to 2024 and have formed the basis of charging in the 2020-2021 period in the absence of approved RP3 Plans and pending the revised Plans.

2.22 This decision was approved by European Member States at a Single Sky Committee meeting in 2020 and has resulted in the level of charging by ANSPs being far lower than the costs incurred as a result of the pre-pandemic traffic forecasts depressing the unit charges. Consequently, with billing based on actual traffic, ANSP revenue has been much lower than what it otherwise would be with actual traffic taken into account for the unit charges. This has created a liquidity crisis for ANSPs despite a regulatory provision that approved costs incurred during that time would be fully recoverable by 2029.

2.23 Notwithstanding the regulatory treatment of charging in 2020 and 2021, and the scope in the regulation for National Supervisory Authorities to subsequently assess actual costs incurred over that period, IAA ANSP is including information that has informed the charges in place during the pandemic.

2.24 En route unit costs had been expected to increase by 6.6% in 2020 to cater for growing traffic levels. But it is also shown that this projected increase was offset by a number of adjustments that resulted in revenue being returned to users. Similarly, for the terminal unit rate an increase in cost had been expected given the completion of the new Dublin Tower. The relevant adjustments are also presented.

[7] https://www.aviationreg.ie/_fileupload/IAAANSPSlidesforConsultation%202020.pdf

Figure 2 IAA ANSP Consultation material from July 2020 (En Route)

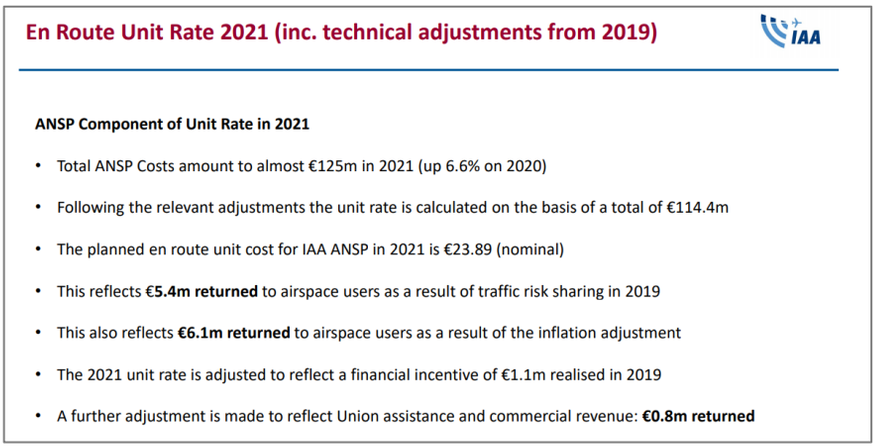
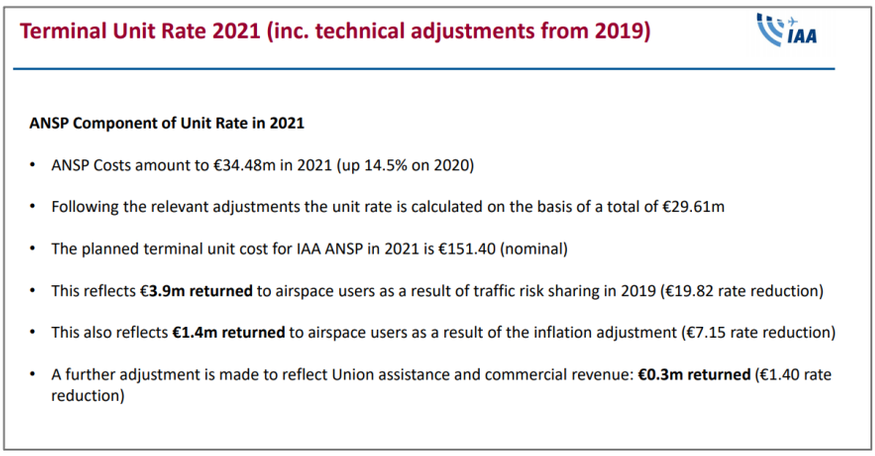


Figure 3 IAA ANSP Consultation material from July 2020 (Terminal)



2.25 It is important to note in context of charges for 2020 and 2021 that the IAA ANSP was one of a small number of ANSPs across Europe that spent lower than had been determined in the base year of RP3 (i.e. 2019). Conversely, however, European ANSPs have been heavily criticised by the PRB in the lead up to the revised RP3 because so many ANSPs incurred more costs than had been determined in 2019 in what is perceived to be an attempt to lead to a more favourable RP3 outcome in spite of a short term financial loss.

2.26 For the avoidance of doubt, the underspend by IAA ANSP in 2019 is testimony to the efficiency of its operation. The underspend materialised despite en route traffic being 8.8% higher than what had been included in the regulatory plan 2019 and the net effect of this development is that it has resulted in the Union-wide cost efficiency targets being more onerous for IAA ANSP in RP3 relative to those ANSPs who spent more than what had been determined in 2019.

2.27 With regard to terminal charges, it is important to state that comparing terminal charges across Europe are very unreliable comparators. The Spanish terminal charge, for example, does not reflect the total cost of service provision. The most recent edition of the ACE Benchmarking Report indicates that the income from terminal charges in Spain accounts for just 14% of the overall costs of providing the terminal ATC service. Similarly, the Maltese and Greek terminal charges account for 56% and 10% respectively of the required costs[8].

[8] https://www.eurocontrol.int/ACE/ACE-Reports/ACE2018.pdf

2.6 NSA expectations of the ANSP Business Plan

2.28 IAA ANSP received a guidance note from the NSAs in February 2021, which had the purpose of identifying what was required from us in this Business Plan given the particularly tight timelines surrounding the consultation process over the summer months. In summary, the note confirmed that the Business Plan prepared in 2019 provided considerable levels of detail but it also identified a number of areas where further detail is required in this Business Plan to pre-empt questions that commonly arise.

2.29 We have therefore structured our Business Plan in a manner that meets the requirements of the NSAs and other stakeholders – it must be recognised, however, that this Business Plan has been developed in a significantly constrained environment and is therefore likely to evolve at a time that the NSAs are carrying out their pre-consultation review. These constraints include:

a. A draft Business Plan has been required by the NSAs for review within approximately one month after issuing the Guidance Note and before the availability of Union wide targets for the revised RP3 Process.

b. There continues to be considerable uncertainty surrounding the recovery in traffic and as of March 2021, ANSPs have been advised to rely on scenario projections from the beginning of November. There is a question as to whether revised RP3 Plans will be based on updated forecasts expected in May 2021.

c. Consistent with the document published in January 2021 on our cost containment programme, this will remain under constant review depending on the nature of the recovery.

2.30 The purpose of this section is to avoid a situation where the Draft Performance Plan submitted to the European Commission by 1 October is predicated on a certain set of assumptions from the first half of 2021, or before this time, that have been superseded by events in Q3 2021. The Performance Plan submitted to the European Commission should be as robust as possible to ensure the relevant services required in the period to 2024 are not compromised.

Key Points to note in relation to the Background to this Revised RP3 Business Plan
1. The EC did not complete its review of the original Draft RP3 Plan in Q1 2020 due to the pandemic and a revised RP3 Regulation followed in November 2020
2. This revised Business Plan has been prepared at a time of continued uncertainty surrounding the nature of the recovery in air travel
3. IAA ANSP has implemented a phased cost containment programme since March 2020 with payroll reduction measures in place until January 2022. Decisions had to be made in real time with no certainty around the evolution of the pandemic or an aviation recovery. It is important therefore that any retrospective review of actions taken in 2020 and 2021 is not based on the benefit of hindsight
4. Amidst the regulatory and traffic uncertainty, almost half of the five-year RP3 period will have elapsed without an approved RP3 Plan
5. IAA ANSP has fully engaged with the relevant consultation requirements and is keen to meet NSA expectations with this revised RP3 Business Plan

3. The revised RP3 Regulatory Framework

3.1 The first RP3 Regulation (2019)

3.1 The regulatory framework in place at the beginning of RP3 was based on a new European Regulation, Commission Implementing Regulation 2019/317, that was published in February 2019[9]. Along with our European counterparts, Ireland's RP3 Plan was prepared on this basis and submitted to the European Commission for review in October 2019.

3.2 At the beginning of 2020, the RP3 Performance Plans were still being reviewed by the European Commission. Consequently, ANSP charges across Europe for the first year of RP3 had been set in accordance with these draft State Plans. By extension, our budget and plans in general were geared towards the expected traffic growth and it is therefore appropriate to compare cost savings against what had been planned in 2020 as opposed to 2019 costs, particularly as it was mid-March before the unprecedented traffic downturn.

3.3 The implication of setting charges in this manner is that Airspace Users incurred unit charges that were calculated on the basis of projected costs (pre-pandemic) and the corresponding traffic forecasts from the beginning of 2019. With the onset of the pandemic, it has been possible to contain certain costs, but the extent of the sustained traffic decline implied that the revenue arising from actual traffic has been insufficient to cover the overall cost of service provision.

3.4 This process was repeated in 2021 following a decision several months prior to set ANSP charges in 2021 in accordance with pre-pandemic cost projections and traffic forecasts. This provided some relief to the aviation industry but served to exacerbate the liquidity crisis facing ANSPs.

3.5 The uncertainty that prevailed throughout 2020 extended to which Regulation would govern the Performance and Charging Scheme. Despite the publication of a new RP3 Regulation in 2019, the following points provide further context surrounding the uncertainty that we faced in 2020:

1) We did not have an approved RP3 Plan in 2020 but were nonetheless required to ensure we provided an excellent service irrespective of traffic levels,
2) Official traffic forecasts from STATFOR were not provided since before the onset of the pandemic – various scenarios were published but regularly downgraded,
3) It was not clear whether the existing Regulation would apply from the perspective of the traffic risk sharing provision or whether a revised regulation would prevail – it was not clear what form a revised regulation would take.
4) Once the revised regulation was published at the end of 2020, we continued to lack guidance on what was expected from a cost containment perspective, particularly due to the reference in the regulation to having regard to actual costs in the emergency years 2020 and 2021.

3.6 It is not appropriate to dismiss this level of uncertainty facing ANSPs by noting that airlines were also subject to the same level of uncertainty in 2020 and 2021. The key difference is that airlines

[9] Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0317&from=EN

are not governed by the RP3 Performance and Charging Scheme and are not constrained from a cost containment perspective in relation to the regulatory developments. For example, before Member States approved the revised RP3 Regulation, the European Commission stated at an Appeals Committee it would have regard for actual, and even though the meaning of this was not entirely clear, it further constrained our ability to implement cost savings. In addition, ANSPs have statutory duties delegated to them from States and cannot act outside these statutory requirements.

3.7 Given the extraordinary events of 2020, it is understandable that some uncertainty would exist for a time. However, even with the finalisation of a revised RP3 Regulation towards the end of the year, significant uncertainty has persisted in relation to many areas including the treatment of actual costs, detailed below.

3.2 The revised RP3 Regulation (2020)

3.8 A revised Regulation for RP3 was published on 3 November 2020. Commission Implementing Regulation (EU) 2020/1627[10] states that "*The extraordinary circumstances caused by the COVID-19 pandemic have a significant impact on the current processes and measures for the implementation of the performance and charging scheme in the third reference period 2020- 2024 ('RP3'), including the setting of performance targets and unit rates as well as the application of incentive schemes and risk sharing mechanisms. That has created an exceptional situation which needs to be addressed with specific temporary measures*".

3.9 There was also recognition that any shortfall in eligible and justifiable costs would be recoverable over a period of at least five years from 2023. The revised Regulation stated that "*the corresponding unit rate adjustments should be exceptionally spread over a time period of 5 calendar years. National supervisory authorities should be allowed to extend the time period to 7 calendar years, where this is necessary in order to avoid a disproportionate effect of the carry-overs on the unit rates charged to airspace users.*"

3.10 This revised RP3 regulation has had the effect of deferring the debate on what constitutes an efficient level of spend by ANSPs during the pandemic. The Regulation did confirm that "*due account should be taken of the actual costs incurred by air navigation service providers and Member States*" when setting the revised cost-efficiency targets. However, this was not reflected in the revised PRB targets that followed in March 2021 as the PRB has sought to ensure that ANSPs share the financial burden with airlines.

3.11 The Draft Implementing Decision (March 2021) does, however, indicate that "*it is appropriate to expect ANSPs to adapt their cost bases in an adequate manner in response to the reduced traffic demand over RP3 and that, as a result, the Union-wide determined costs in the combined year 2020 and 2021 do not exceed on average 93% of the Union-wide actual costs recorded for calendar year 2019…*".

[10] Commission Implementing Regulation (EU) 2020/1627 of 3 November 2020 on exceptional measures for the third reference period (2020-2024) of the single European sky performance and charging scheme due to the COVID-19 pandemic. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1627&qid=1604477086805&from=EN

3.12 The data submitted to the PRB in December 2020 shows the great difficulty faced by European ANSPs in terms of scaling operating costs to traffic at any given time. Essentially if too much cost is removed, service will either be unavailable or severely impacted.

3.13 The PRB has been determined to ensure that ANSPs *share* the financial burden with airlines but this premise is fundamentally flawed due to the key differences with the respective business models – airlines have demonstrated the ability to park aircraft as required, and there have been regulatory developments in Europe to assist with this. Conversely, ANSPs simply cannot remove staff from the payroll in line with relatively short-term traffic developments and when there are repeated calls throughout the emergency years of 2020 and 2021 to prepare for an imminent recovery. This was clearly understood by the Director General of DG MOVE, Mr. Henrik Hololei, when he stated in front of the TRAN Committee in 2020 that there are no plans to deplete ANSPs of resources as they are required for the recovery.

3.14 Despite the change of rules governing RP3 in 2020 that were designed "*to alleviate the severe impact of the COVID-19 pandemic on airspace users during RP3*", this has not prevented airspace users from having unrealistic short-term expectations from ANSPs.

3.3 Traffic Forecasts for the revised RP3 Period

3.15 Traffic forecasts are detailed in Section 5 but from a regulatory perspective, the revised RP3 Regulation states that "*Reassurances have been received as to the publication of an updated STATFOR traffic forecasts for RP3 in early November 2020 [which] will provide the basis for initiating the revision of Union-wide performance targets for RP3".* In line with this, on 4 November 2020 – one day after the revised regulation was published – STATFOR issued three scenarios of traffic growth, which took a different form compared to the conventional forecasts. In fact, throughout 2020 EUROCONTROL had explicitly cautioned that its scenarios of growth were not to be treated as forecasts due to the high levels of uncertainty.

3.16 Nonetheless, the PRB advised ANSPs to prepare revised RP3 Plans on the basis of Scenario 2 of 3. This advice was required as ANSPs were required to submit initial estimates for the RP3 Period in December 2020 in order to inform the PRB's target setting process. This recommendation was not aligned with recommendations from the Network Manager at the time, which indicated a preference towards a more optimistic Scenario 1 of 3.

3.17 By March 2021, the draft revised PRB targets were published on the basis of the traffic growth Scenario 2 of 3 from the beginning of November, despite legitimate queries from stakeholders on whether it is more appropriate to base the revised RP3 Plans on updated forecasts, expected in May 2021 – particularly as the first few months of 2021 took a somewhat unexpected downturn, which is likely to impact the duration of the overall recovery period.

3.18 This question remained unanswered at the time of preparing the Draft Business Plan but the Plan has been finalised on the basis of Scenario 2 from May 2021. Now the same uncertainty exists in relation to forecasts due in October 2021.

3.4 ANSP Data submitted to the PRB in December 2020

3.19 The revised RP3 regulation (Art. 6) required ANSPs to submit a report to the NSA detailing the measures put in place to address the financial and operational impact of the pandemic on their activities. There was a clear need for this data covering actual cost containment measures in 2020 and those planned in 2021, and in addition to providing the relevant data, we prepared a more

comprehensive report that was subsequently published on CAR's website. This report is contained in Appendix 4.

3.20 A notable shortcoming with the revised RP3 regulation is that it also required ANSPs to provide initial cost data for the period to 2024 during 2020 at a time of great uncertainty. It was stated that this data was required by 15 December 2020 in order to enable the Commission to set the revised targets. The implication of this is that ANSPs had less than six weeks to respectively identify their overall requirements during the revised RP3 period, which was not enough time to fully consider the requirements, particularly as it came at a time of immense uncertainty.

3.21 Moreover, even though the recommendation from the PRB was to prepare figures on the basis of Scenario 2 of 3 produced a few weeks earlier, there was much uncertainty about vaccine efficacy and rollout, which was reflected in the three scenarios which ranged from the pandemic ending in 2021 to the vaccines being limited in effectiveness.

3.5 PRB Consultation in February 2021

3.22 The consequence of requiring initial cost estimates to be submitted in December 2020 is that it had led to a premature debate amongst ANSPs, airlines and the PRB, which continues to play out before meaningful consultations can take place in 2021.

3.23 This was evident at the beginning of February when the PRB held a consultation on the revised RP3 targets, where target ranges were provided. In a consultation meeting that lasted approximately 3 hours, attendees were informed that the data supporting the consultation material would follow by the end of February.

3.24 It was at this meeting where it became clear that much of what was being proposed was not aligned to the new regulatory framework. Whereas the revised RP3 regulation states that due account should be taken of actual costs incurred by ANSPs in 2020 and 2021, the PRB confirmed that actual costs will be taken into account following certain reality checks.

3.25 To illustrate the level of uncertainty that has persisted following the revised RP3 Regulation, at this consultation, the PRB stated the following:

(a) If RP3 timelines are not met this year, the plan to have adjustments flow through 2023 will be deferred

(b) The whole system will be blocked with no approved plans if States/ANSPs do not sort out the cost efficiency issue

(c) Cost levels must reflect the drop in traffic and the new reality

(d) Service Units flown will bring Revenue to ANSPs / Service Units not flown will not bring revenue to ANSPs

(e) There are still some reserves in the system from RP2

3.26 Many of these points raised by the PRB in its consultation did not appear to be aligned to the RP3 legal framework. Nonetheless, in response to a request from CANSO for flexible targets reflecting the uncertainty, the PRB stated that the legal framework does not allow it.

3.27 In response to queries on the treatment of costs of capital in the revised RP3 period, the PRB confirmed that the only requirement is transparency. We could, therefore, have a situation where costs of capital vary to a significant extent across Europe, thereby contributing to an unlevel playing field.

3.28 In response to a request from an ANSP to provide an example of how savings could be realised, the PRB noted that this is not the work of the PRB but it would nonetheless encourage States and ANSPs to speed up programmes available to them including basis administration restructuring.

3.6 PRB documents in March 2021

3.29 Three key publications became available at the beginning of March 2021:

- On 1 March, the European Commission published its draft Implementing Decision in relation to the revised RP3 targets, following advice from the PRB.
- On 2 March, the PRB advice to the European Commission on setting revised RP3 targets was published.
- Also, on 2 March, the PRB published a monitoring report setting out the financial and operational impact of the pandemic on SES States.

3.30 The draft Implementing Decision acknowledged that "*It is understandable that air navigation service providers are not fully able to adjust their cost bases in line with such an unprecedented drop in traffic, due to the high share of fixed costs and the obligation to continuously maintain the availability of services"*.

3.31 Despite this, the proposed cost efficiency targets did not take due account of actual costs in 2020 as the targets for the combined 2020 and 2021 period would require an impossible level of costs to be removed during the remaining months of 2021.

3.32 The data published by the PRB in its monitoring report was very high level with many of the relevant categories aggregated. The PRB concluded that ANSPs show considerable differences on the measures implemented to contain costs in 2020. 14 ANSPs reported cost reductions up to 27% against 2019 actuals, 10 show little to no differences, and the remaining five ANSPs increased their 2020 costs compared to 2019 actual costs.

3.33 The revised RP3 targets required approval from the relevant Member States before 1 May 2021, in line with the revised RP3 regulation. This means that despite the significant volume of works, consultations, discussions at national and EU level, IAA ANSP had been required to develop its business plan for the five year period, with no certainty of the overall Union-wide targets until recently, no indication of how these will be interpreted at local level and ongoing uncertainty around traffic levels, recovery timeframes and requirements.

3.7 Draft Implementing Decision on revised RP3 targets

3.34 Despite the focus of the Draft Implementing Decision being the revised targets that are subject to change, the Draft Implementing Decision in March provided some guidance – in March 2021 – on measures that ANSPs should take. This advice appears to be geared towards identifying how ANSPs can comply with the cost efficiency targets. The recommendations are as follows:

(a) ANSPs should take commensurate measures in order to improve cost-efficiency during RP3 and take advantage of all synergies and efficiency gains available through cross-border cooperation and restructuring initiatives.

(b) Structural changes, including efficiency gains offered by new technological solutions comprised in the ATM Master Plan and the rationalisation of redundant CNS infrastructure, should be pursued as a matter of priority.

(c) Further cost savings should be possible in respect of overtime costs, which were estimated to amount to 4% of the total actual costs in 2019 but are expected to remain very limited over RP3

(d) ANSPs should strongly consider voluntarily waiving or reducing the return on equity which they are allowed to recover as part of air navigation charges

3.35 In relation to (a) above, with ANSPs in survival mode due to the liquidity crises that they are confronted with it is not an ideal time to be prioritising cross border cooperation initiatives, with high upfront costs, as a means of complying with the RP3 cost efficiency targets. We do not consider that this is a viable means of achieving a material reduction in costs during the RP3 period in relation to Irish airspace and the shared interface with the UK (airspace which no longer falls within the scope of the SES).

3.36 In relation to (b), IAA ANSP understands that this point is primarily aimed at mainland Europe where there is scope for considerable rationalisation from an infrastructure perspective. Where there is a reference to redundant CNS infrastructure, it is the case that there are replacement and maintenance costs associated with assets that have reached end of life. IAA ANSP is committed to ensuring an appropriate balance in this respect, but also from an environmental perspective, and this is reflected in the capital investment plan which is focussed on obsolescence. This principle is also relevant for the services required over the course of this Plan from Aireon.

3.37 Naturally, the same level of pre-2020 overtime costs will no longer be required. The PRB has estimated that 4% of pre-pandemic costs were attributed to overtime, which should be greatly reduced during RP3. We agree that overtime should be more limited during RP3. Our equivalent figure is 1.9% of total en route costs in 2018, which implies that on this basis alone, the cost efficiency targets are not as easily attainable by our ANSP compared to those who have had higher overtime costs before the pandemic.

3.38 In relation to (d) above, the draft Implementing Decision is indicating that ANSPs should volunteer to reduce their determined rates of return. This key component of the Performance and Charging Scheme is based on well-established empirical evidence. With ANSPs in crisis mode and phased cost containment programmes required, it does not follow that ANSPs would voluntarily forego any reasonable rate of return that they are entitled to, particularly when this is required to access credit facilities. In addition, were it not for the ability of the IAA to establish robust cash reserves in recent years, it is evident that there would have been a risk that the State would have had to step in to support the ANSP through the crisis or there would have been a significant decline in service levels.

3.39 As set out above, we have provided reasoning on why we do not believe that the recommendations by the European Commission are an appropriate or sufficient means of meeting the proposed cost efficiency targets over the RP3 period.

3.40 The European Commission has further stated that ANSPs should be able to respond to the circumstances deriving from the crisis while building up capabilities to meet future traffic demand and addressing the structural issues impacting operational performance. Put differently, the European Commission is saying that its proposed targets on cost efficiency enable ANSPs to provide the necessary capacity during RP3 and to implement the measures which are necessary to accommodate future traffic growth, including securing appropriate resources and the training of air traffic controllers and investments in modern technology. We have prepared a detailed analysis in Section 7 which shows how this is not achievable from an ATFM perspective, and it is clear that a similar principle applies from a cost efficiency perspective.

3.8 Assessment of Actual Costs in 2020 and 2021

Official Position of the European Commission

3.41 On 2 June, the European Commission published Commission Implementing Decision (EU) 2021/891, setting revised Union-wide performance targets for the air traffic management network for the third reference period (2020-2024) and repealing Implementing Decision (EU) 2019/903. It states that "*it is understandable that air navigation service providers are not fully able to adjust their cost bases in line with such an unprecedented drop in traffic, due to the high share of fixed costs and the obligation to continuously maintain the availability of services*".

3.42 This European Implementing Decision, which IAA ANSP is subject to, further states "*Therefore, it is appropriate to expect air navigation service providers to adapt their cost bases in an adequate manner in response to the reduced traffic demand over RP3 and that, as a result, the Union-wide cost-efficiency performance targets for RP3 should be based on the assumption that the Union-wide determined costs in the combined years 2020 and 2021 do not exceed on average 97 % of the Union-wide actual costs recorded for calendar year 2019".*

The UK CAA

3.43 On 7 June, the Civil Aviation Authority in the UK published a paper in relation to the economic regulation of NATS (En Route) plc. The CAA confirmed the position of NERL which was to suggest that the CAA's review should avoid the use of artificial ex post efficiency benchmarks derived with benefit of hindsight. The CAA confirmed in this paper that it does not intend to use the benefit of hindsight to assess the efficiency of NERL's decisions.

Key Points to note in relation to the Revised RP3 Regulatory Framework
1. IAA ANSP commenced 2020 with budgets and plans predicated on expected growth and the Draft RP3 Plans submitted to the EC in Q4 2019
2. Significant regulatory uncertainty prevailed in 2020 until the RP3 Regulation was revised in November 2020 - traffic related uncertainty has continued since
3. The EC note in its Draft Implementing Decision that *it is understandable that air navigation service providers are not fully able to adjust their cost bases in line with such an unprecedented drop in traffic, due to the high share of fixed costs and the obligation to continuously maintain the availability of services*
4. There has been a severe lack of guidance from the PRB on how ANSPs can comply with the proposed cost efficiency targets
5. The EC also stated that ANSPs should be able to respond to the circumstances deriving from the crisis while building up capabilities to meet future traffic demand and addressing the structural issues impacting operational performance.

4. Meeting the needs of our Customers

4.1 Customer Care Programme in 2019

4.1 Our Customer Care Programme is a key tool for communicating key IAA messages to our Airline customers and is a mechanism for them to provide detailed feedback, in face to face meetings and through an independently administered online survey. This gives our people a greater understanding of what our customers think of us and of what kind of ATM services they want us to deliver. It fulfils the ANSP's consultation obligations under Commission Implementing Regulation (EU) no. 1035/2011.

4.2 Each year, we meet with a representative sample of our Customers (30 in 2019) across Europe, North America and the Middle East, the most important markets for the IAA. These airlines cover all the major passenger and freight business models, from Ultra-Low-Cost Carriers to Full-Service Airlines.

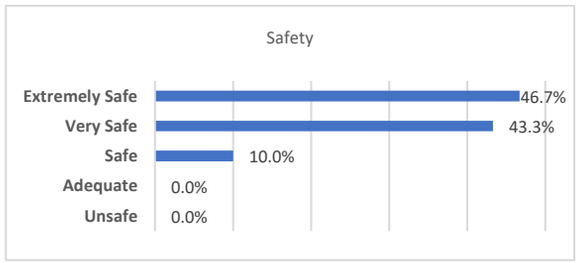
4.3 This group was responsible for 83% of flights in Irish airspace and 82% of IAA ANSP's revenues during the year.

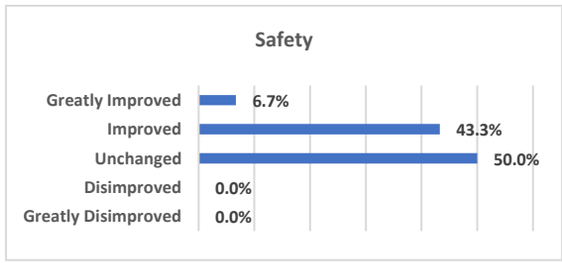
4.4 Since 2017, we have used a new survey format. Customers were asked to provide their opinions of the IAA's ATM operation in the safety, financial and service delivery areas. The survey measured Customer attitudes, their perception of change and scores for overall Customer Service. Schuman Associates collated the data from the survey responses and compiled a report for the IAA. The results of the survey are set out overleaf. Schuman contacted our Customers directly and asked them to complete an online survey/questionnaire which was hosted on the European Union's EU SURVEY website.

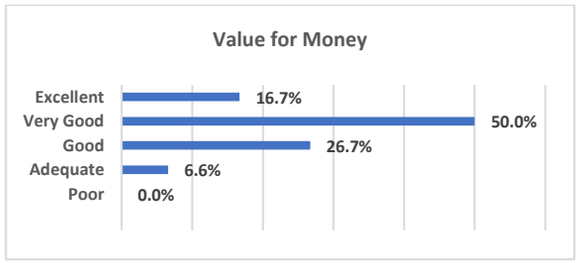
4.5 The results of the 2019 independent survey show that the overall level of Customer Satisfaction with the IAA was 90.2%. This performance reflects the IAA's consistently low user charges, excellent delay performance, highly efficient airspace, ongoing support of the commercial aviation industry and high levels of Customer engagement.

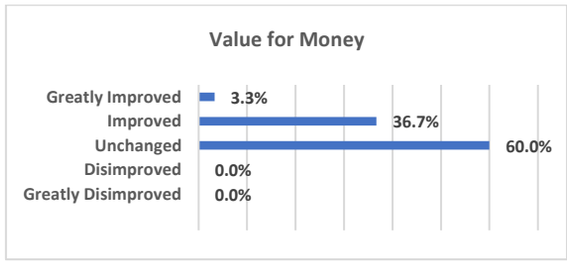
4.6 A summary of the feedback from our Customers from the 2019 survey is shown below. In almost all cases across the five KPAs, our Customers said that our performance was either unchanged or had improved. In the case of Customer Service however, 3.3% said that we had disimproved, driven by their experiences at an increasingly congested Dublin Airport. Results from the independent survey are set out below.

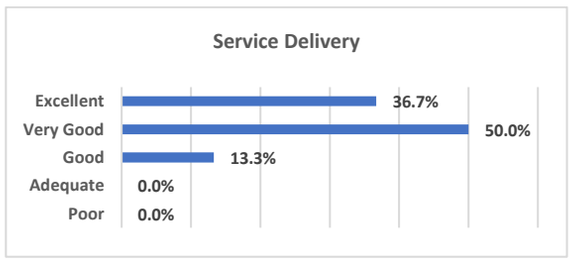
Figure 4 2019 Customer Care Feedback

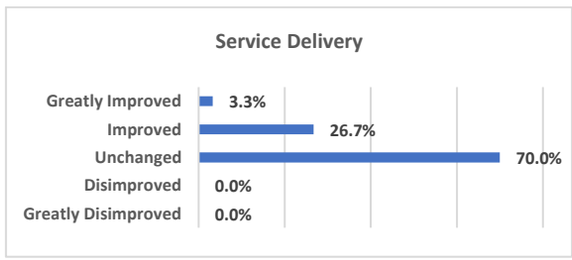


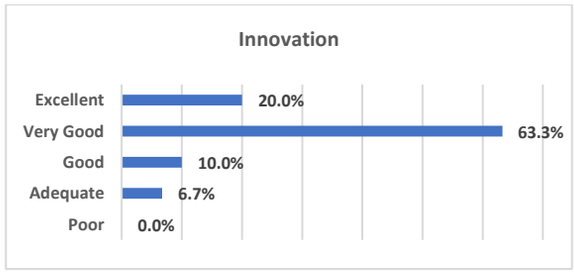


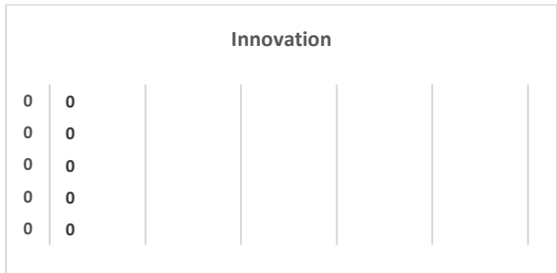


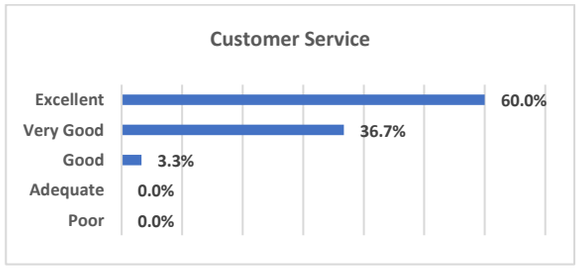












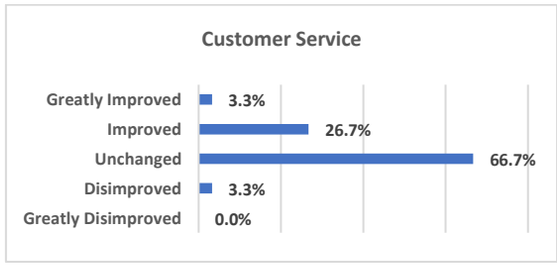


Figure 5 2019 Customer Survey Headlines

4.7 We also asked Schuman Associates to provide our customers with a list of 5 operationally relevant Key Performance Indicators (KPIs) and ask them to rank them in order of importance to their business. Their responses told us that overall, Low Delays was the most important KPI to their airline. Our customers' rankings for the KPIs in 2019 are set out in order of importance in Figure 3.

Table 1 Airspace Users ranking of key metrics

1	•Low Delay
2	•Operational Resillience
3	•Low User Charges
4	•Efficient Airspace
5	•Customer Relationship

4.8 Approximately 20% of customers said that each KPI was the most important to their airline, an indicator that we must maintain a focus on all five.

4.9 The IAA ANSP takes the feedback from the Schuman Associates' independent survey and uses it to inform our Operations and Technology plans to ensure that they can be aligned with the needs of our customers as well as those of our people.

4.2 Customer engagement in 2020

4.10 During 2020, the IAA ANSP's Customer Care team regularly spoke with many of our airline customers to try to ascertain the volume of flights that they were planning to operate in the immediate future and over the medium term.

4.11 The volatility of passenger demand, initially as a result of COVID-19 related health concerns and later due to the unpredictable changes in national travel restrictions meant that many of the airlines were unable to accurately predict exactly which flights they would operate, outside of an extremely short planning horizon of between two and three weeks.

4.12 ✂.

4.13 Airlines made significant cuts to their schedules but cancelled even more flights very close to the day of departure when expected advance bookings failed to materialise. For example, as late as mid-October 2020, Ryanair said that it expected to operate 40% of its normal winter schedule capacity during the winter 2020/2021 season (25 Oct 2020 – 27 Mar 2021) whereas it has operated as little as 8% of 2019 traffic levels during that period.

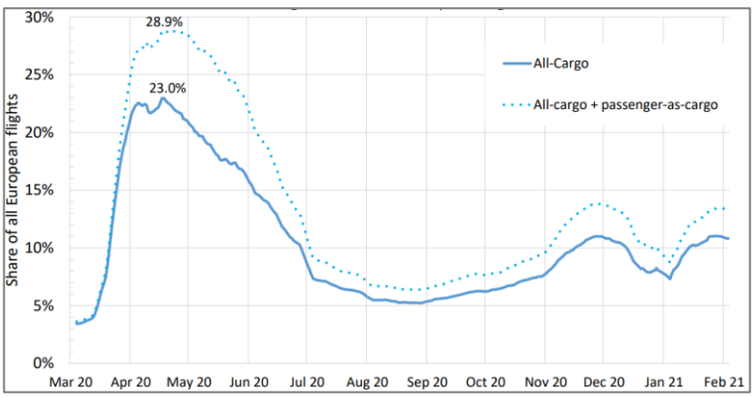
4.14 In mid-October 2020, Aer Lingus said that it planned to operate between 18% and 20% of its normal winter schedule but for the winter season to date, it has operated as little as 8% of capacity. In October 2020, British Airways advised that it intended to operate 30% of its winter capacity but the actual traffic during has been as low as 11%. In October 2020, Lufthansa said that it would operate approximately 25% of its winter season capacity but has operated consistently below 20% of normal capacity and as low as 16%. In all cases, our airline customers said, and continue to say, that they cannot provide definitive forecasts for the coming months.

4.15 At the same time, cargo airlines report that they are having a bumper year. FedEx said that there has been no reduction in demand for cargo capacity and that there has been an increase in the number of short notice cargo charters that it is operating. It went on to say that on time performance is its number one priority and encouraged the IAA to maintain its excellence in this area. ASL Airlines Ireland said that it is very busy with its ACMI business. It operates freighter aircraft for carriers including Amazon Prime Air, DHL, FedEx and UPS and reminded the ANSP that punctuality is the number one priority for these customers.

4.16 US based cargo carrier, Atlas Air, that had lost $461m in 2019, reported an operating profit of $495 in FY 2020 as demand for its cargo capacity increased and it continued to add capacity to its Amazon contract. CEO of the Lufthansa Group, Carsten Spoor, said in an interview hosed by EUROCONTROL, that its cargo airline was booming and that it was delaying the retirement of its MD-11 freighters. All said that on time performance was critical to their businesses.

4.17 EUROCONTROL shows that cargo has become a commercial lifeline and so airlines have sought to maximise their cargo capacity, which includes use of empty passenger aircraft to carry cargo.

Figure 6 Cargo share of all European flights



Source: EUROCONTROL[11]

[11] https://www.eurocontrol.int/sites/default/files/2021-02/eurocontrol-data-snapshot-all-cargo-flts-market-share.pdf

- All-cargo freighter aircraft in pre-pandemic years accounted for approximately 3-4% of total European flights.
- All-cargo flights continue to have 3-4 times their normal market share in Europe, boosted by passenger aircraft flown as cargo.

4.3 Customer Care Programme in 2020

4.18 Towards the end of 2020, the ANSP's Customer Care team held virtual meetings with 20 of the IAA's largest customers by revenue, providing an update on the IAA's performance over the year and the actions we had taken to contain costs while at the same time putting in place a resilient operational plan to ensure that we could provide ATM services, 24 hours per day across our operation.

4.19 Included in the cost containment measures discussed was the cancellation of two classes of Student Controllers. Almost all airlines said that they hoped that this would not result in the IAA ANSP having insufficient ATCOs to provide enough capacity to avoid delays when the traffic returned post the COVID-19 downturn. Several said that the ANSP should avoid the mistakes of previous downturns and make sure that we have enough ATCOs to cope with the traffic when it returns.

Figure 7 2020 Customer Care Survey Summary Table

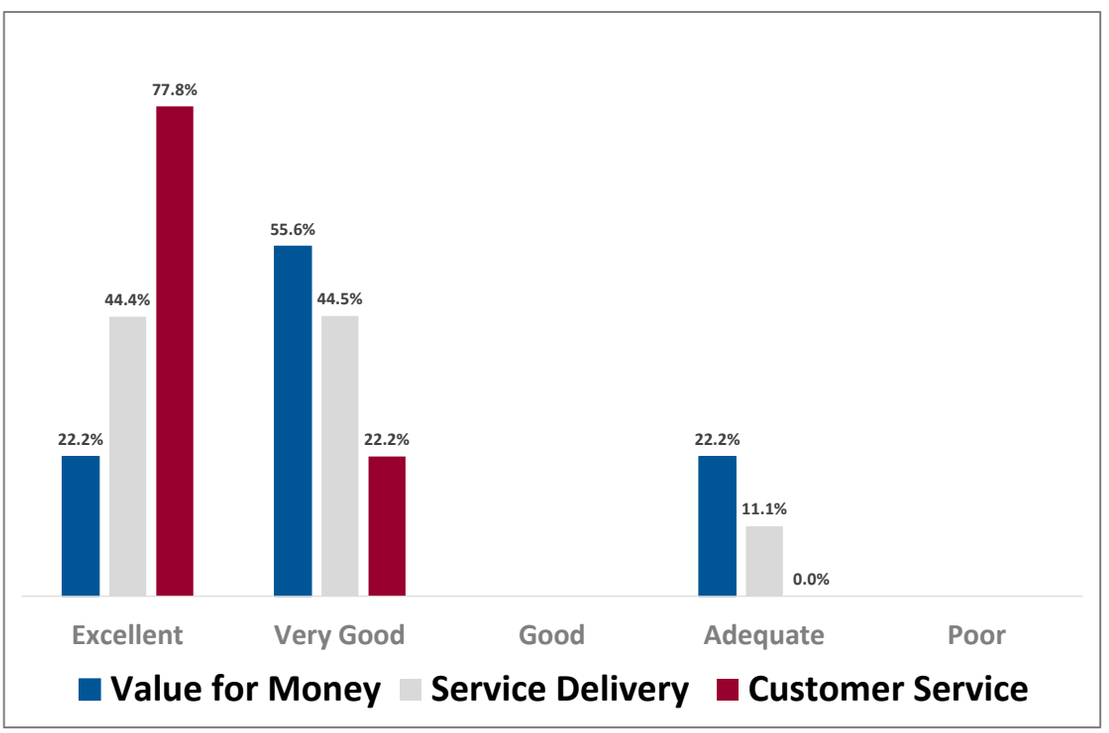
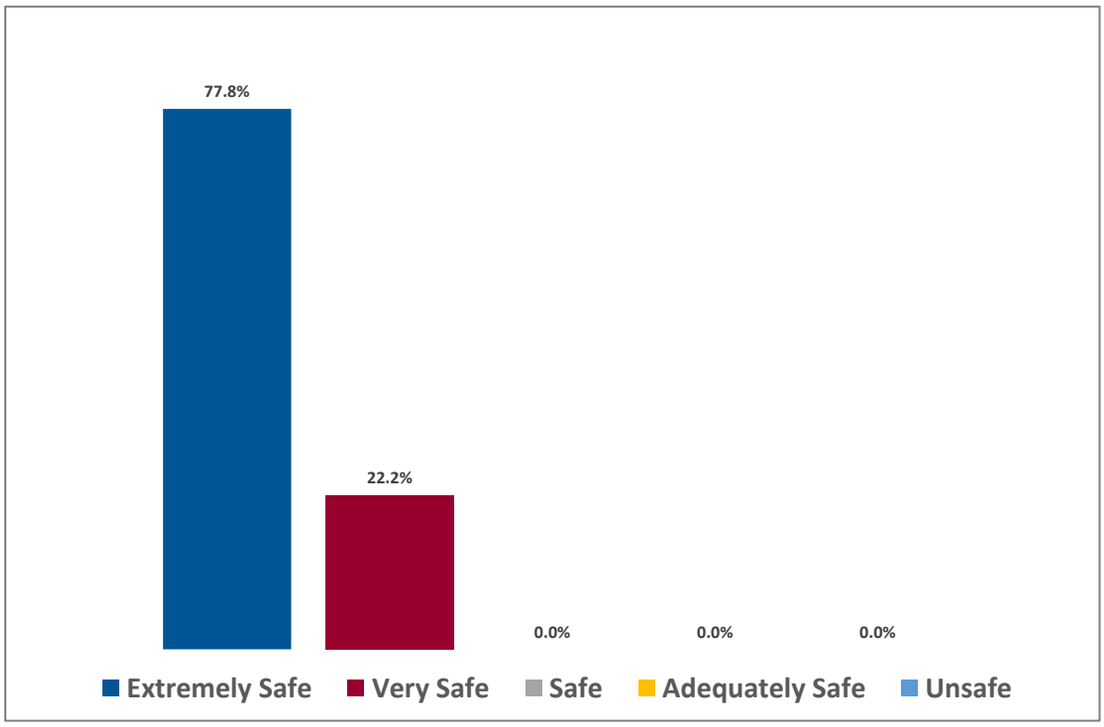


Figure 8 2020 Customer Care Survey Results (Safety)



4.20 The wider aviation community also expressed concerns about the effects of insufficient staff and capacity. Airlines for Europe (A4E) was of the view that "ATC capacity and staff shortages were responsible for more than 70% of all en-route flight delays between January and June 2019[12]". EUROCONTROL reported that the reasons that generated the greatest level of en-route ATFM delay in 2019 were en-route ATC capacity (32%), en-route ATC staffing (17%)[13].

4.21 We also asked our Customers to select which Key Performance Area is most important to their business and this is the overall order of importance that was selected for 2020

Table 2 Airspace Users ranking of key metrics

1	Low Charges
2	Low Delay
3	Efficient Airspace
4	Operational Resilience
5	Good Customer Relationship

4.22 The 2020 result reflects the increased emphasis that airlines placed on cost control as they struggled to deal with the economic implications of the collapse in passenger traffic due to the COVID-19 pandemic.

[12] A4E: https://a4e.eu/publications/european-atc-remains-inefficient-expensive-and-unreliable-for-millions-of-passengers/
[13] EUROCONTROL: Annual Network Operations Report 2019

4.23 The overall customer satisfaction rating in 2020 was 87.11%.

4.4 Key Union-wide developments

4.24 In January 2021, Henrik Hololei, Director General of the European Commission's DG MOVE said in an interview hosted by EUROCONTROL that ANSPs should prepare for the future and be ready to deliver when we are back to normal. He said that ANSPs should make sure that enough ATCOs are trained and available to deliver services when needed.

4.25 During a PRB Webex on 4th February 2021, Dani Weder (PRB) said "don't stop investments but use them to improve efficiency". On the same Webex, CANSO said that we don't want to repeat the mistakes made post 2008/2009 where costs were cut, and capacity not put in place to cope with demand throughout RP2.

4.26 During the PRB Webex on 4th February 2021, both the PRB and IATA referred to building flexibility into capacity provision so that capacity and the attendant costs would flex with actual traffic demand. Neither body however provided any suggestion of how this might be done. The reality is that this is an aspirational concept and is more to do with the airspace users not wanting to pay for capacity unless they use it but at the same time, wanting the capacity to be available, whenever they want to use it. At this time, neither the airspace users, the PRB, the EU, EUROCONTROL nor the ANSPs know exactly how to achieve it. It is however certain that the technology that will facilitate such flexibility will not come without a cost and, will not be available to European ANSPs during RP3.

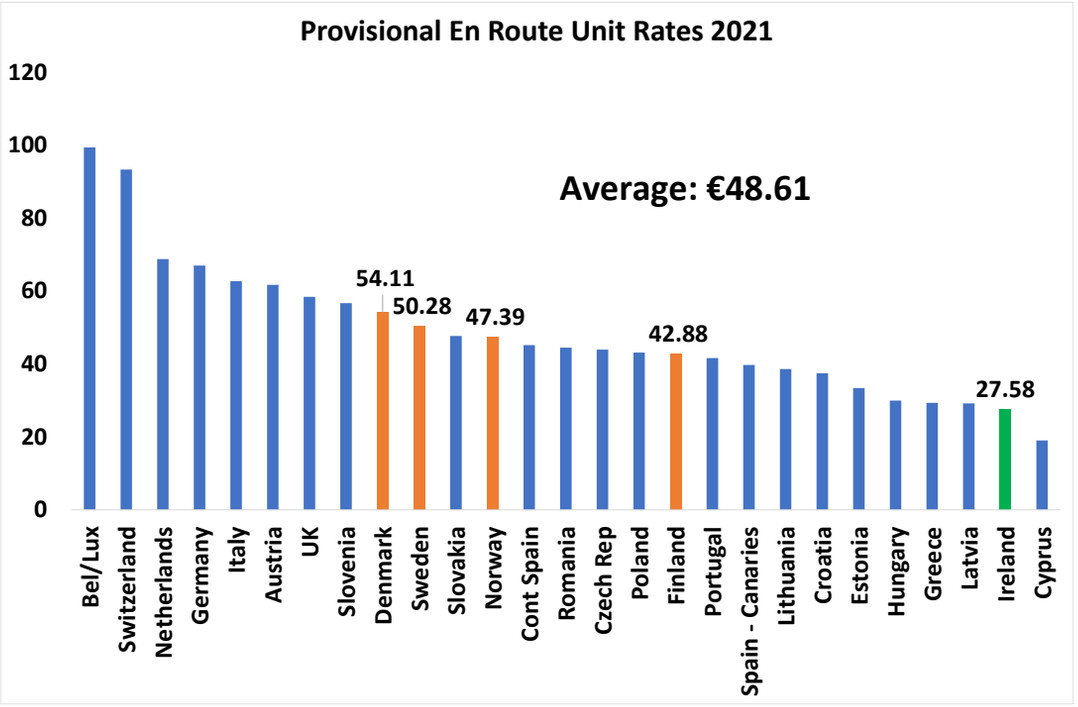
4.5 Customer Interest

4.27 IAA ANSP has implemented a cost containment programme that ensures a lower cost base since March 2020 than would otherwise have been the case. Details of these initiatives have been in the public domain since January 2021 and are also detailed extensively in Appendix 4 Cost Containment . The Employment Wage Subsidy Scheme will, for example, offset the charges that are implemented in the RP3 period.

4.28 IAA ANSP also participated in a programme designed to provide financial relief to airspace users at the outset of the pandemic. This resulted in charges over the period February-May 2020 being deferred and not required in full until July 2021. IAA ANSP also extended this relief from en route services to terminal services and North Atlantic Communications.

4.29 IAA ANSP is not aware of any other ANSP that voluntarily committed to returning unspent capital expenditure in RP2 in full. This was not required under the relevant Regulation, but IAA ANSP nonetheless decided that it was appropriate from a customer interest perspective.

Figure 9 Comparing the en route unit rates across 27 different charging zones in 2021



4.30 IAA ANSP has one of the lowest en route unit rates in 2021 of the 27 charging zones listed above, and the rate of €27.58 is 43% lower than the overall average.

Key Points to note in relation to the needs of our customers
1. The results of the 2019 independent survey show that the overall level of Customer Satisfaction with the IAA was 90.2%.
2. Low Delays was ranked first in terms of importance followed by operational resilience and low user charges.
3. It became clear in 2020 that our Customers were concerned that the suspension of ATCO training programmes would lead to capacity issues during the recovery
4. Low user charges ranked first in terms of importance in feedback from customers in 2020, up from third place in 2019. It was followed by low delay ranked in second place.
5. Throughout the pandemic IAA ANSP has undertaken several initiatives that demonstrate it has high regard for Customer interest. We extended financial relief from en route to terminal activities, availed of the EWSS Scheme and continued to honour our commitment to return unspent capital expenditure in full.
6. Of the 27 European charging zones presented, IAA ANSP had the second lowest en route charge in 2021
7. Airline customers have consistently indicated to the IAA ANSP that they require a safe, high quality and reliable service. This plan outlines the necessary investments in staff, capex and other costs of business required to meet these expectations and to continue to deliver customer requirements.

5. En Route and Terminal Traffic 2019-24

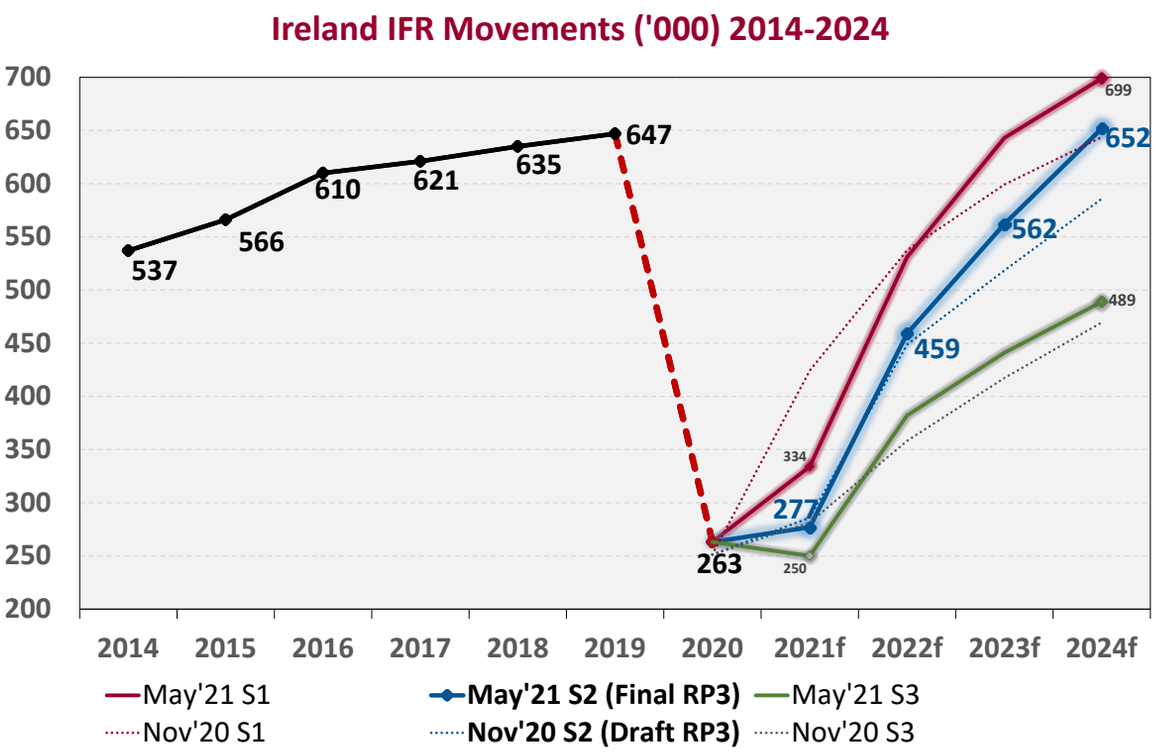
5.1 Overview

5.1 This RP3 Business Plan has been updated in line with the revised forecasts from STATFOR in May 2021. Furthermore, in response to the Draft Tables submitted ahead of the June 2020 Enlarged Committee meeting, EUROCONTROL confirmed that STATFOR Scenario 2 traffic forecasts should be used.

En Route	2020 Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast
STATFOR S2 May 2021	1,988,290	2,072,000	3,202,000	4,039,000	4,726,000

Terminal	2020 Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast
STATFOR S2 May 2021	70,511	77,000	136,000	163,000	188,000

STATFOR Scenario Projections to 2024: IFR Movements in Ireland



- A full recovery is expected by STATFOR by 2024 but the range is indicative of considerable uncertainty: Scenario 1 (+8%) Scenario 2 (+1%) Scenario 3 (-24%) on 2019

- The latest Base Case Scenario has 111,000 additional movements in Ireland over the period 2021-2024 compared to the equivalent EUROCONTROL STATFOR scenario 6 months prior (November 2020)

- Almost all (99%) of these additional movements come in the final two years of the forecast period 2023-2024.

Table 1: Breakdown of Total IFR Movements (Scenario 2)						
	2019	2020	2021	2022	2023	2024
Overflights	54%	59%	57%	53%	55%	56%
Arrival / Departures	45%	39%	41%	45%	44%	43%
Internal	1%	2%	3%	2%	1%	1%

5.2 As set out in Section 3, by March 2021, the draft revised PRB targets were published on the basis of the traffic growth Scenario 2 of 3 from the beginning of November, despite legitimate queries from stakeholders on whether it is more appropriate to base the revised RP3 Plans on updated forecasts, expected in May 2021 – particularly as the first few months of 2021 took a somewhat unexpected downturn, which is likely to impact the duration of the overall recovery period. This question remained unanswered at the time of preparing the Draft Business Plan, but the Plan has been finalised on the basis of Scenario 2 from May. Now the same uncertainty exists in relation to forecasts due in October 2021.

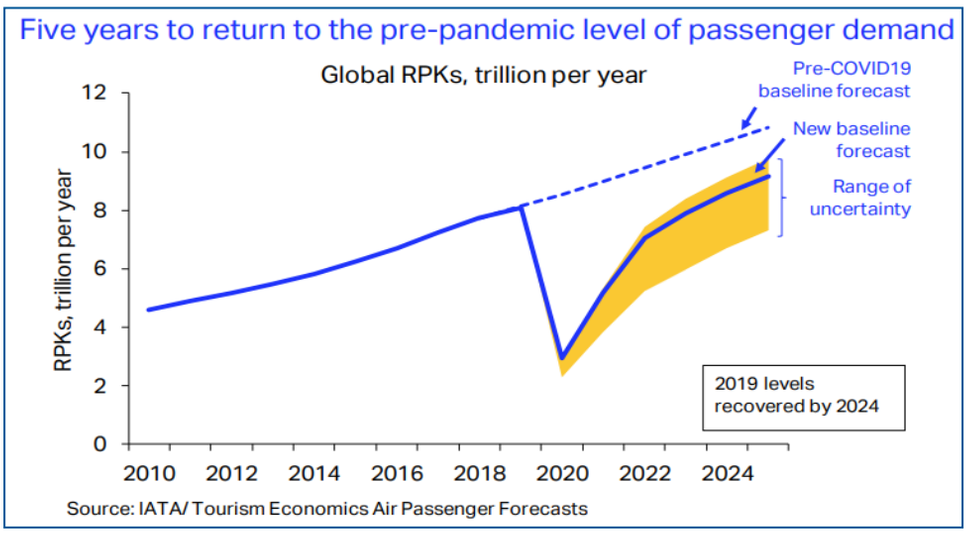
5.2 Traffic Developments in 2020

5.3 The official traffic forecasts that ANSPs receive biannually were not available in 2020 due to the high level of uncertainty. At the outset of this pandemic, some analysts were considering a scenario whereby there would be a V-Shaped recovery from the perspective of (i) the economy as a whole and (ii) the aviation industry. This type of recovery would have involved the sharp decline followed by a sharp recovery. This was the environment in which our cost containment programme first commenced in March 2020. As the pandemic continued beyond initial lockdowns and with no indication that it is near a conclusion, these scenarios were discounted during the summer of 2020.

5.4 Based on CSO data from May, June and July, IBEC noted that the Irish economy is experiencing a K-shaped recovery whereby some industries remain unaffected or are benefitting from the pandemic whereas other industries would continue to ensure weak demand. An important caveat on this analysis is that the availability of a vaccine in the first half of 2021 could have seen a recovery profile similar to that following a natural disaster whereby a significant portion of demand returns relatively quickly but without a return to pre-crisis levels.

2.1 IATA's number one scenario in March 2020 was that there would be a limited spread of COVID and that affected markets would experience a V shaped recovery profile, but the following month IATA noted that the scale of the crisis makes such a sharp recovery unlikely.

Figure 10 IATA Projections (July 2020)



5.5 At the end of July 2020, IATA expressed the view that travel demand (globally) will return to 2019 levels in 2024 but that the downside could be much more severe. Shortly before the publication of this scenario in July 2020, IAA ANSP implemented Phase 2 of its cost containment which comprised almost all staff transitioning to a 4.5 day working week.

5.6 IATA further noted in August that consumer sentiment remains subdued and close to a record low due in part to concerns about containing the virus, rising unemployment and the continuity of government support programmes in the months ahead. Consequently, demand for leisure travel will remain subdued and lead to a recovery that is gradual and patchy

5.7 STATFOR developed scenarios in November on the following basis. The relevant assumptions underpinning each scenario is listed below followed by the relevant projections for Ireland.

Scenario 1

- Vaccine widely made available for travellers, or the end of the pandemic, by Summer 2021
- Some long-haul flows restarting quicker than others (e.g. North Atlantic first)
- European recovery to 2019 traffic level in 2024.

Scenario 2

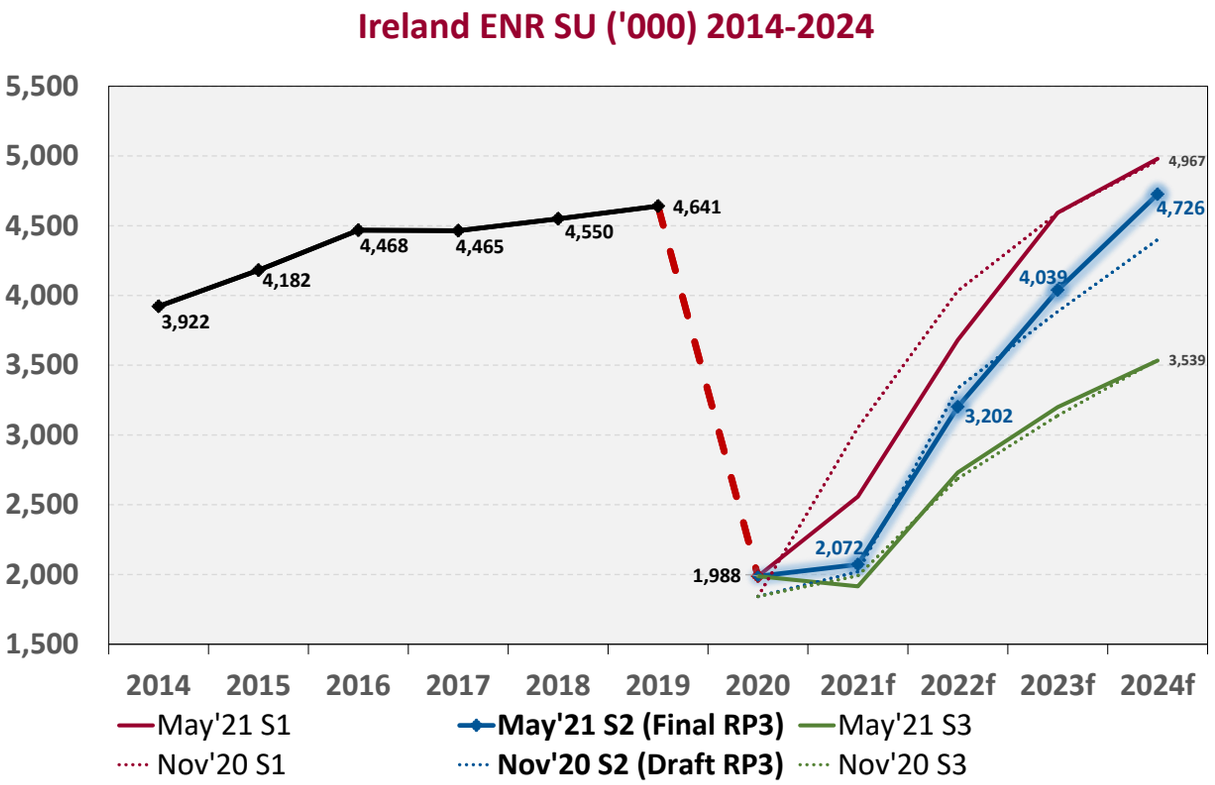
- Vaccine widely made available for travellers, or the end of the pandemic, by Summer 2022
- Some long-haul flows restarting quicker than others (e.g. North Atlantic first)
- Some travellers still reluctant to fly (elder leisure, business class travellers)
- European recovery to 2019 traffic level in 2026.

Scenario 3

- Vaccine widely made available by Summer 2022, but update is patchy
- Lingering infection and low passenger confidence
- Permanent drop in propensity to fly; European recovery to 2019 traffic level in 2029.

5.3 En Route Traffic Outlook for RP3

STATFOR Scenario Projections to 2024: En Route Service Units



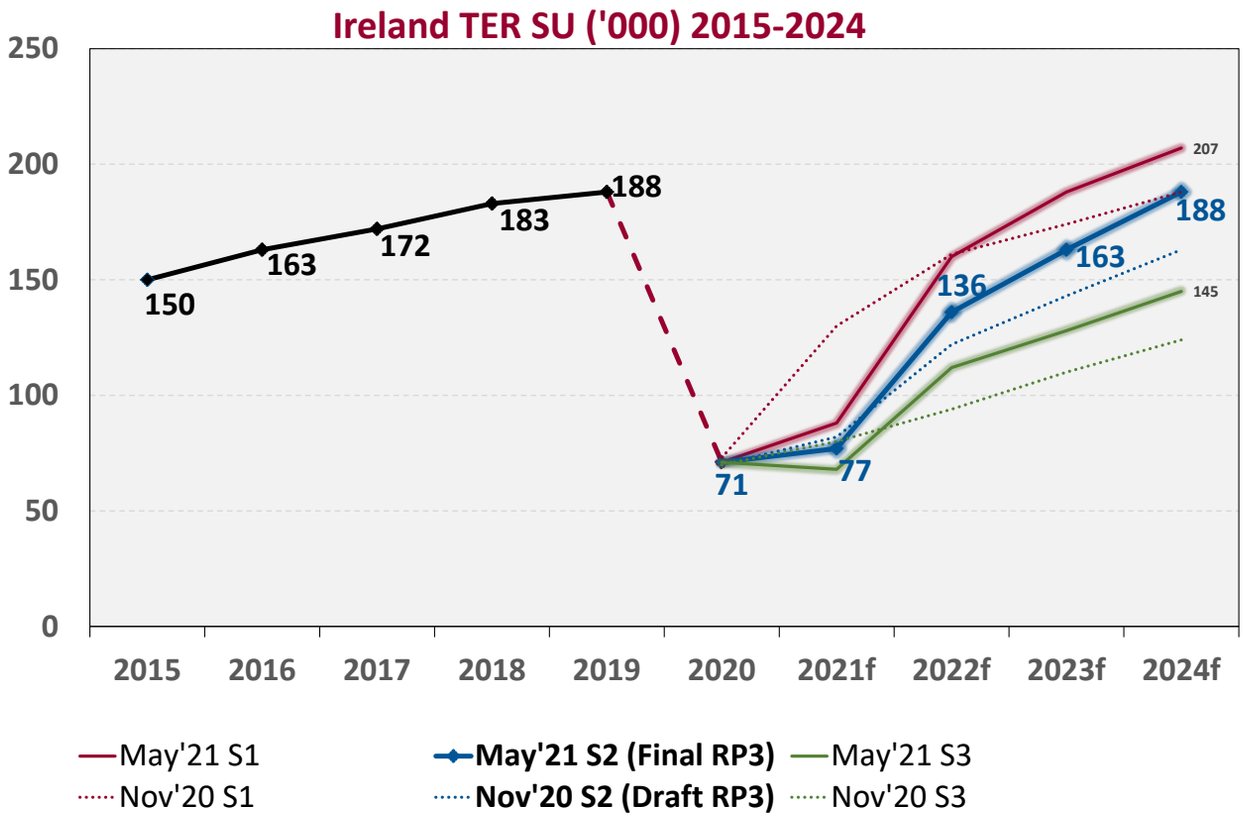
- Service Units will be 31% below 2019 levels in 2022, 13% below 2019 in 2023 before recovering (+2%) in 2024, according to the baseline Scenario 2

- The scenarios in 2024 compared to 2019 range from -24% to +7.0%. The base case Scenario 2 (+1.8%) is particularly close to Scenario 1. (86% of range v midpoint at 50%). Irish ENR traffic exceeds 2019 levels (which was a record high) by end 202.

- The equivalent range in Europe (RP2 Region) is -28% to +8%. The base case Scenario 2 is -4% (66% of range v midpoint at 50%)

5.4 Terminal Traffic Outlook for RP3

STATFOR Scenario Projections to 2024: Terminal Service Units



- Terminal Service units declined by 62% in 2020 and will remain 59% below 2019 levels in 2021 according to the latest Scenario 2

- Service Units will be 28% below 2019 levels in 2022, 13% below 2019 in 2023 before recovering in 2024, according to the baseline Scenario 2

  Scenario 2 (May 2021) is 15.3% higher in 2024 compared to the equivalent scenario 2 in November 2020. It indicates that Irish TMA traffic will have returned to 2019 levels by end 2024.

  Under Scenario 1, terminal service units would be 10% more than 2019 levels by 2024 whereas Scenario 3 would see traffic levels 22.9% lower than 2019.

5.5 Cost of providing an essential service

5.8 Full air traffic control services must be provided on a 24-hour basis in all Irish controlled airspace irrespective of actual traffic levels. Flight information services must similarly be provided outside controlled airspace. The three state airports are all open to operations on a 24-hour basis and a full air traffic control service must be available. Mandatory safety and security requirements dictate that some ATCO supervisory positions must be open irrespective of traffic levels. Therefore, as with other essential services there is a very significant proportion of staffing that

must be provided irrespective of the traffic level. There is a very significant difference between the skill set, qualifications and equipment of en route, approach and control tower ATCOs. Local geographical considerations also vary greatly between airports. Whereas IAA has maximised multiple ATCO ratings and roster flexibility, there are limits to these. A very significant proportion of ATCO staffing is related to the requirement to provide our air traffic control services rather than the volume of traffic.

5.6 New Traffic Projections for RP3

5.9 The European Commission made the below statement at the Single Sky Committee meeting in March 2021 and IAA ANSP will therefore have to reassess its revised RP3 Business Plan following the publication of STATFOR forecasts in May should there be a "*significant change in traffic assumptions*".

As provided for in Implementing Regulation (EU) 2019/317, local circumstances will be taken into account when assessing the consistency of proposed national or FAB performance targets with the Union-wide targets. Accordingly, in respect of the draft performance plans to be submitted by Member States by 1 October 2021, the consistency assessment of the revised local cost-efficiency targets will specifically take into account the degree of divergence of local traffic evolution from the corresponding Union-wide traffic figures used as basis for the revision of Union-wide targets for RP3.

In addition, the Commission services will consider as part of the consistency assessment any significant change in traffic assumptions between on the one hand the STATFOR traffic forecast (scenario 2) of November 2020, and on the other hand the STATFOR traffic forecast, expected in May 2021, which is due to constitute the basis for the revision of RP3 local performance targets. Also, in respect of the time period preceding the submission of revised draft performance plans, the actual costs incurred by ANSPs and Member States will be taken into account, except where those costs comprise unjustified expenditure or ineligible cost items.

Regarding local baseline values, it is underlined that each Member State should establish their own baseline values at local level, on the basis of the actual costs and traffic of calendar year 2019. This baseline value may be adjusted to reflect relevant changes between the reference periods.

Key Points to note in relation to En Route and Terminal Traffic
1. For a prolonged period in 2020, there was a general expectation and public pronouncements by various groups that traffic could rebound rapidly following the record decline
2. Reputable industry bodies regularly revised projections downwards, which continued through Q1 2021 with the deteriorating epidemiological situation
3. Traffic Scenarios became available one day after the revised RP3 Regulation in November, and ANSPs have been asked to revise RP3 Plans on this basis. These were updated in May 2021, and further revised forecasts for the RP3 period are expected in October 2021.
4. There is a real cost of providing an essential service of which traffic is just one of many contributing factors

6. Performance of IAA ANSP

6.1 Safety

Overview of ATM Safety

6.1 Safety is the IAA ANSPs number 1 priority. The IAA is committed to complying with all applicable safety regulatory requirements and striving, whenever practicable, to go beyond compliance and operate to the highest international safety standards. Our task therefore is to provide a safe, efficient and reliable Air Traffic Management (ATM) service to meet the changing needs of our Customers.

6.2 Our strategy objective of operating to the highest levels of international safety standards is supported by our participation and engagement with CANSO Europe and Global, Eurocontrol Safety Teams and associated workgroups. By active participation with the Safety Team's workgroups and CESAF Advisory Board we strive in influencing the Commission and EASA with respect to proportionate regulation and realistic and meaningful performance scheme targets. Moreover, through participation in performance benchmarking and Standard of Excellence (SOE) safety maturity questionnaire developments, we share our own best practices while implementing those developed in peer organisations, that maintains us both in Europe and globally as a leading ANSP with respect to operational safety performance and maturity.

6.3 We seek to achieve continuous improvement to the current high level of safety-management by ensuring that the system is risk-based, systematic and corroborated by objective evidence.

6.4 As safety will never be taken for granted this Plan includes a baseline of costs involved in all aspects of safety including monitoring, checking, training, systems, data analysis, promotion and safety intelligence.

RP2 Safety (2015-2018) Safety Key performance Indicators.

Effectiveness of Safety Management (EoSM)

6.5 Following an ICAO continuous monitoring approach audit in 2015, Ireland was ranked second in Europe and fourth in the world for civil aviation safety oversight. In 2016, Ireland maintained its second-place ranking in Europe for civil aviation safety oversight. IAA achieved the joint highest score of the European FAB ANSPs with a safety maturity of 92% in 2017. In the penultimate year of RP2, the IAA achieved Level D with an expected top 5 place with respect to the Effectiveness of Safety Management (EoSM). We were fully compliant with Just Culture and all of the RP2 targets were exceeded.

Table 3 IAA ANSP EASA EoSM Annual Measurement Survey Results 2015-2019

IAA ANSP EASA: EoSM Annual Measurement survey.		
2015	84%	SES ANSP Average 79%
2016	92%	SES ANSP Average 80%
2017	91%	SES ANSP Average 82%
2018	92%	SES ANSP Average 83%
2019	92%	SES ANSP Average 84%

6.6 The EoSM metric continued to be the key measure of SMS for the remainder of RP2. The IAA ANSP's maturity is documented with the measurement score of 92% in 2019, being in the top 5 in the SES area. A new version of the EoSM will be an RP3 SKPI, employing more detailed and higher levels of justification and evidence, across a wider scope of SMS activities.

6.7 The equivalent CANSO/Eurocontrol 'Standard of Excellence' safety maturity measure assessed globally, places the IAA's performance in this regard, for the second year in succession, at the top of 44 participating ANSPs.

6.8 The objective is the continuation of this level of SMS performance in RP3.

Risk Analysis Tool

6.9 With regards to the implementation of RAT severity classification methodology, the IAA ANSP adopted this in February 2011 for risk classification of occurrences of Separation Minima Infringement, Runway Incursions and ATM Specific Occurrences (ASO). Since 2012 all occurrences of Separation Minima Infringement and Runway Incursions have been analysed using RAT. Similarly, ATM Specific Occurrences (ASOs) of ESARR severity classification "C" and above have also been analysed. Since 1st January 2015, all ASO occurrences have been analysed using RAT. The TOKAI which integrates RAT was successfully deployed in 2018, supporting the enhancement of our safety intelligence processes and focused safety performance improvement activities through this particular integration and overall safety tools strategy.

Just Culture

6.10 In the area of Just Culture, defined as "A culture where staff are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts are not tolerated", we recognise that it must be just for the individual staff member, the IAA and our Customers. We will continue to embed a recognised Just Culture into the organisation, where all are clear about what is expected of them in a Just Culture environment.

6.11 We will ensure that Just Culture training is cascaded from the leadership level throughout our organisation. Particular focus will be placed on the training of appropriate senior management and those personnel required to undertake safety occurrence investigations. The training will incorporate appropriate personnel from the top level to the newest recruit and will be tailored accordingly, whilst simultaneously recognising that the just culture training objective will be achieved through open engagement across a mix of seniority and specialism.

6.12 The IAA ANSP will ensure that this training is maintained on an on-going basis by including within our documented staff training and induction programmes. The training has been effectively implemented during RP2 to date with delivery of significant progress demonstrated by 2017. The training shall be delivered in a manner appropriate to the individual staff members with 100% of identified staff completing their training by 31st December 2019. The IAA Just Culture process and supporting activities has been validated as a CANSO Global SOE 'Optimised Best Practice' annually since 2017.

Corporate ATM Safety Strategy 2016-2020

6.13 The ANSP has made very significant progress to date towards meeting the strategy's Safety Goals in all 4 thematic elements of the strategy. The IAA ANSP already has a strong and effective SMS in place, which is enabling us to achieve the SES RP2 target "Level D" of measured maturity, well in advance of the 2019 RP2 deadline. While this is an important achievement, the ATM Safety Strategic Plan is designed to build upon this and to concentrate our ATM safety efforts across a range of key focused activities.

6.14 Our ATM Safety Strategy sets out three key areas of activity in order to deliver upon this objective that will continue in RP3 are Safety Culture Survey, Safety Communications and Human Factors:

Safety Culture Survey

6.15 Safety is the responsibility of all employees in the IAA and a safety culture is designed to ensure that all employees take ownership of enhancing safety in their daily work. Challenging ourselves as an organisation, we initiated and completed our second Safety Culture Survey in 2016 with the assistance of Eurocontrol and the London School of Economics. The Safety Culture and HR 'Wellness' surveys delivered symbiotic action plans that addressed the many common areas identified in both reports.

6.16 This approach was validated globally by the CANSO Standard of Excellence (SOE) moderation team in 2018 as a recognised 'Optimised Best Practice'. The ANSP's SMS relevant 7-point action plan was initiated in late 2016 and is now complete. The approach has enabled us to cultivate an organisational wide safety and wellness ethos, rather than focusing solely on operational safety. In accordance with best practice and to ensure the continuing sustainment and development of our Safety Culture we will plan the next ANSP survey for activation in late 2021 or early 2022. This activity while a key SMS (EoSM measurement) requirement, its scheduling is dependent on the reduction of the current COVID -19 impact.

Safety Communications

6.17 We will continue to evolve and mature our Safety Communications Network at operational unit level, empowering individuals to support bottom-up initiatives to drive safety performance improvement. This involves empowering the Team Safety Reps (TSR) through the provision of bespoke SMS Education modules. This will enhance their knowledge as Subject Matter Experts, facilitating and supporting the communication of their teams input to the SMS. The TSR concept is continuing to embed in the local operational units' safety management systems. Annual education and Safety Management System refresher training will become a focused activity in 2020, supported by the Safety Management Unit, utilising our online eLearning 'Brightspace 'platform.

Human Factors

6.18 Human Factors and human performance have become increasingly important areas of analysis when considering ATM safety performance. The IAA has developed a Human Factors (HF) Policy and a Procedures document during RP2 which was initially implemented in 2017, coinciding with the commencement of externally provided HF specific training for local 'actors' operating at unit level.

6.19 The strategy's objective of creating a specialised HF expert function in the Safety Management Unit has now been achieved with employment of a HF Expert at the beginning of 2019. This now affords us with an in-house specialisation and expertise to support local HF actor activity at the unit level. In addition, it provides the ANSP with the capability to meet its regulatory compliance with respect to the HF assessments for all changes to the ATM system supporting deeper levels of safety assurance.

6.20 During RP3, we will also use this specialisation to support the evolution of our safety investigation process, through the application of focused Human Factor analysis, to go beyond to compliance so as to fully understand how best to provide continuous safety performance improvements in a focused and efficient manner. This strategy will enable a high level of feedback (Lessons Learnt) that will drive tailored safety performance enhancements, through focused training and procedural improvements.

Safety Performance Analysis

6.21 The IAA's Safety Management Manual requires each operational unit to conduct a mitigating / improvement activity based on trend analysis of occurrence data and to report the results in a standard Quarterly Operations Safety Report. These reports monitor trends in their top five local Key Risk Areas (KRAs) of:

1) Separation minima infringement
2) Runway incursions
3) Unauthorised penetration of airspace
4) Deviation from ATC clearance
5) Level Bust

6.22 The Safety Management Unit through its specialist analyst function, provides the data and analysis reports to support the operational units in this essential activity. The IAA will continue to strive for a reduction in the rate of occurrence of events in these KRAs by targeted training and awareness campaigns for both internal and external stakeholders and will ultimately support the achievement of the Union-wide targets for RP3.

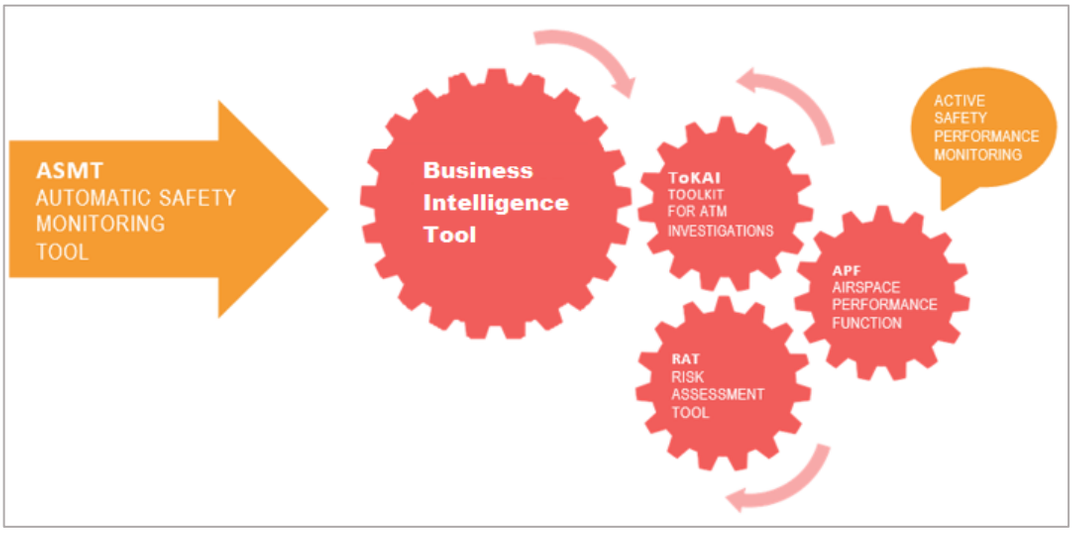
6.23 We have successfully pursued the above safety goals during RP2 to date and intend to review and progressively update these during RP3.

Safety Intelligence

6.24 The IAA ANSP employs a range of tools, applications and indicators to enhance our ATM safety monitoring, measuring and analysis. These tools central to which is our integrated Business

Intelligence tool, assists in building our safety intelligence, which informs safety actions and future decisions.

Figure 11 IAA Safety Tool Applications



6.25 The IAA ANSP uses smart safety tools such as TOKAI, RAT and APF to measure safety performance through various lenses and to analyse the factors behind safety occurrences or trends (positive or negative). The diagram above indicates the interaction between the various safety tools and applications, which the IAA uses. Utilising information from these tools also positions us to move towards a Performance-Based Environment and Risk Based Oversight.

6.26 The Aerospace Performance Factor (APF) and the RAT tools are now fully operational and integrated with TOKAI. The APF Mindmaps were re-weighed for the National APF and in addition, Unit specific APF Mindmaps were created to more accurately reflect unit risk weightings for their own specific operational environment. The occurrence investigation and reporting tool – TOKAI, was fully deployed in Q2 2018 and integrated with the 'TARGIT' Business Intelligence (BI) Tool. The output of this integration is the development of 'real time' safety performance 'dashboards', which has enabled the achievement of an EoSM Level 'E' continuous improvement in 2018 in addition to validation by CANSO Global moderation team as a Standard of Excellence 'Optimised Best Practice'.

6.27 New versions of the TOKAI and BI tool will be deployed in the 2020-2023 delivering further improvements to the overall integration and therefore Safety Intelligence activities. Automatic Safety Monitoring Tool (ASMT), for example, is a key component of a robust safety management system. ASMT is a means to automatically gather data related to safety events from our operational systems that occur in our controlled airspace. It is currently being tested and will enable us to:

- Automatically monitor and record safety-related events using operational data
- Have easy access to recorded data through a web-based replay tool providing a better understanding of the situation
- Provide automatic computation of the risk score that feeds into the Risk Analysis Tool

6.28 The information that we obtain from ASMT can assist us in gaining a broader and more objective perspective of current safety issues and safety risk, such as strategic conflict management, separation provision and a better understanding of operational hazards.

6.2 Preparation for RP3

6.29 Providing HF education and analysis training to the ATM Occurrence Investigators to enhance the quality and granularity of our investigation outcomes: 2019-2020. As set out in paragraph 7.56 and 7.57, our existing Unit Safety Managers, Compliance Manager and ATM Standards & Procedures domain have required further resources due to the volume of paperwork and administration, which has increased and the requirements to improve the standards of quality, compliance, and consistency across the entire service provider. The IAA SP is determined to address any deficiencies identified in these areas.

6.30 The impact of Regulation (EU) 2017/373 in terms of the overall regulatory requirement and impact on resources is detailed in full in Section 7.

6.31 This section sets out a list of key actions that were required by our Safety Management Unit in preparation for RP3. A sample of initiatives are listed below that we have committed to:

- Monitoring the effectiveness of the current Safety Culture Action Plan outputs and commence planning the next company-wide survey in 2019 for initiation in 2020. Due to the impact of Covid-19, this activity is rescheduled for 2022;

- Continue to develop the Operational Unit's Team Safety Reps capability through the provision of initial and refresher SMS training/education, thereby maintaining their level of SMS knowledge and necessary skills to communicate and assist in driving unit safety performance improvement.

- Develop and deliver the HF training /education necessary to meet the EU 2017/373 requirements for operational staff's initial and refresher training.

- Utilising the HF expert, complete the practicable application training of all local Unit HF actors in order to integrate Human Factors assessment into the ANSP's SMS 'change assessment' processes in compliance with EU 2017/373 regulation requirements: 2019-2022.

6.32 We finalised our HF Policy and Process in Q1 2019. The Policy and Processes provides the platform to support the future development of our change assessment and occurrence analysis processes, in accordance with current and future regulatory requirements and industry best practice over the period 2019-2023.

6.33 With respect to improving safety intelligence, we intend to deliver on the following key actions:

- Further developments of integrated TOKAI, BI and APF utilising the new versions of the tools, to further enhance our advanced Safety Performance Dashboard quality and content; 2019-2023. Developments in this regard have already commenced with the design and roll out of the Risk Performance Monitoring tool (RPM). This tool is an SMU in-house development based on the APF but more suited to the ANSPs BI integration;

- Complete the acquisition of the ASMT which will be installed on our COOPANS system, allowing for automatic monitoring of occurrences using operational data: Testing and drafting policy and Operational Concept documentation has been a key focus area since 2019 in order to ensure high-quality Safety performance monitoring and analysis capabilities;

- Enhancing the utilisation of the re-weighted severities in National and Unit specific APF /RPM , exploiting fully the capabilities provided by the integration with the TOKAI and BI tool, to provide APF/RPM Unit specific weighted performance functionality.

- In delivering the above requirements, our Safety Management Unit will continue to be committed to considering Safety as a Business or Enterprise process that is operationally applied and tactically implemented. In order to maximise safety and cost effectiveness of our operations we have considered the totality of the change to the operations of the business and not simply any one or a combination of certain elements i.e. safety, environment, cost efficiency and capacity. Certain interdependencies considered are set out below.

6.3 Interdependencies

6.34 The progressive safety maturity and performance during RP2, have been achieved through the implementation of proportionate and focused strategies. These successful efforts however, have required additional financial investments to ensure that necessary structures with dedicated expert and competent specialist resources were available to achieve these level of improvements to the SMS.

6.35 In this context the RP3 does however present significant challenges to meet the set KRA targets in tandem with the impact of the new EU 2017-373 regulatory compliance requirements. This ATM/ANS regulation has a large scope, is very prescriptive in nature, with significant impact on Safety Management, in particular with regard to the resources necessary to both ensure attainment and sustainment of compliance and continue to meet the RP3 Safety KPI.

Safety Key Performance Indicator- EoSM.

6.36 This SKPI, utilising an advance version of the RP 2 EoSM questionnaire is significantly expanded demanding increased granularity, justification and evidence to meet the set target Levels. A good example of this demand is Level D for target for *Safety Risk* that will present a particular challenge due to the impact of the related EU 2017-373 *Management and Oversight of Change* regulation, with its attendant process complexity and significant departure from current process requirements. This will make achieving and maintaining this EoSM Level very demanding. Consequently, it necessitates specific focused specialist and support resources, with a sustained availability for training to achieve and maintain the higher levels of competence, implementation and application of procedures going forward.

6.37 Interdependencies - *Resilient system performance, buffers and trade-offs: 'Managing the interdependencies of complex operational environments and competitive business models'*; are

'to meet the level required Mature ANSPs sustain safe provision of services through managing the organisation in a way that recognises that system safety is at risk from commercial and business models and targets. Such organisations embed safety in organisational processes. The ANSP assigns and distributes resources, both in terms of finances and personnel, to support safe provision of services through safety promotion, safety improvement, safety assurance and safety risk management. EoSM - Component 6, Study Area 18.

6.38 The requirements necessary to demonstrate this level of compliant performance is that: '

- *The financial and personnel resources that are needed to support safe production through safety promotion, safety improvement, safety assurance and safety risk management are reviewed annually.*
- *Business plans are adjusted annually to ensure that these needs are met.*
- *Resource allocation for safe provision of services is assimilated into corporate business planning for operational and selected non-operational departments.*
- *Financial and personnel resources are provided to enable the release of staff for safety activities, such as training. EoSM - Component 6, Study Area 18.*

Human Factors & Fatigue Risk Management

6.39 The ATCO roster compliance requirements of EU 2017-373 and the associated FRM / FRMS (*Fatigue* Risk Management/Fatigue Risk management System) necessitates new processes, expertise, local management and internal ANSP monitoring and management. The impact on the changes is centred on resources for dedicated expertise supported by technical applications i.e. roster tool with IT potential to support FRM and biometric based analysis and assessment. As set out in paragraphs 7.36-7.38, the link between fatigue and the excessive use of overtime and deferred annual leave must be emphasised. As a result of these new processes surrounding Fatigue Risk Management, IAA ANSP is increasingly limited in its ability to rely on overtime to compensate for staff shortages.

Technology and Innovation

6.40 ASMT (Air Safety Management Tool). A key development activity identified in this plan requires technical and IT support and dedicated safety management activities for the deployment, oversight and analysis enabled by the tool for airspace performance and hotspot identification. This initiative is intended to support safety performance improvements and airspace efficiency.

Regulatory Impact

6.41 Is summary, the impact of the combination of EU 376-2014, EU 340-2015 and EU 2017-373, has seen increased demands on current professional staff (ATCO, ATSEP and RO) combining their core activities with additional subsidiary activities e.g. ATM Occurrence Investigators, Human Factor Local actors and Safety Assessment of Change etc. This has resulted in a significant workload increase from 2020, and requires additional standalone resources compared to RP2.

6.4 Performance in 2020

6.42 The PRB Monitoring Report on the financial and operational impact of COVID-19 on the SES was published in March 2021 and section 3.1 on the safety KPA performance in 2020 noted the following: EASA's regular monitoring of key risk areas shows that the reduction in traffic has been matched by a corresponding reduction in occurrences. For the airborne collision key risk area, the rate of occurrences per million IFR movements was slightly lower than in the preceding two years. Meanwhile, the rate of runway collision risk occurrences per million IFR movements remained close to normal levels in the first half of 2020 before declining at the end of the year. The Monitoring Report also states that the trends shown by the preliminary data confirms that safety has remained at a very high level without any indication that performance, based on occurrence analysis, has been reduced due to safety issues related to COVID-19. Consequently, the

management systems in place at the ANSPs appear to have been sufficiently robust and appear to have adequately managed the impact of the changed conditions. This assessment will need to be reviewed after all data becomes available.

6.43 In response to this, IAA ANSP notes that the decline in air traffic levels during 2020 has resulted in a reduction of the total number of occurrences. ✂

6.44 ✂.

6.45 The overall requirements surrounding refresher training during the RP3 period is detailed in Section 7 below.

6.5 Summary

6.46 While substantial developments and improvements were achieved within current resources in RP2, experience has demonstrated that sustainment of achievements across the spectrum of activities is not possible at the consistent high levels required without the new requirements identified in this revised RP3 Plan.

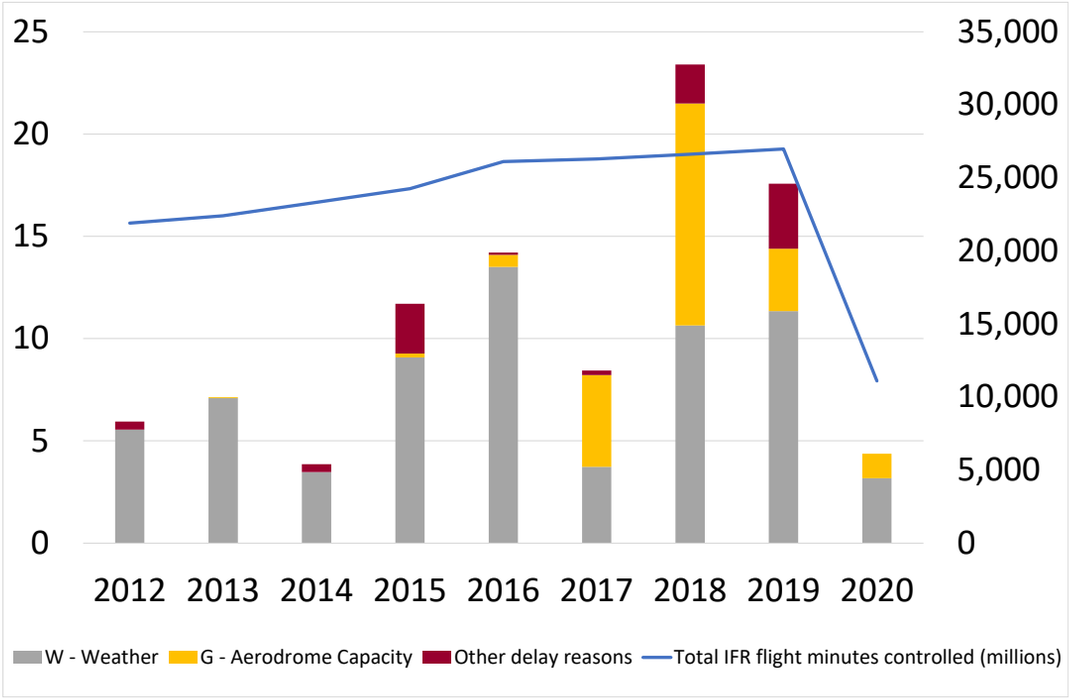
6.47 The ANSP's re-certification experience in accordance with EU 2017-373 very clearly underscores the regulatory demand and the expectations of the Regulator. Therefore, to continue the progression of our successful developments and performance since RP1, in tandem with significant organisational wide compliance demands, the interdependencies and associated resourcing cost issues must be addressed for RP3.

6.48 The impact of Regulation (EU) 2017/373 in terms of the overall regulatory requirement and impact on resources is detailed in full in Section 7.

6.6 Capacity / Environment

6.49 The IAA met all its safety, capacity and environment SES KPI targets during RP2. ATFM delay is a very incomplete indicator for measuring ATC (en-route or airport) capacity. Other indicators such as arrival and departure punctuality, and optimisation of flight profiles give a more complete picture of both capacity and environment performance. The Appendices contain a more comprehensive view of our performance in this regard.

Figure 12 Total AFTM Delay 2012-2020 (mins of delay on right axis)



6.50 Over the RP2 period, the ANSP delivered an excellent service in en-route airspace, with almost no delay and through our free route airspace concept of operations, allowing our airline customers to plan and fly their chosen trajectories through Irish controlled airspace (subject to any constraints associated with their entry to and exit from adjacent airspace).

6.51 Further improvements in en-route flight efficiency are largely dependent upon the introduction of FRA in our neighbouring SPs and with the accompanying system upgrades to enable full cross border FRA. NATS are planning to introduce FRA in UK airspace on a phased basis starting later this year and the IAA will fully cooperate with and assist to facilitate this introduction. This will eventually lead to reduced nautical miles flown with associated environmental improvements.

6.52 ✂. Revised operating procedures and participation in the Dublin Airport A-CDM[14] programme are some examples of our efforts in this area.

En-route

6.53 In 2019, 55% of all flights controlled by IAA ATCOs were overflights. Our en-route ATCOs manage the transition flights between European and Oceanic airspaces through our extremely efficient free route airspace. Almost 90% of all transatlantic flights between Europe and North America passes through Irish controlled airspace and the service we provide is vital to facilitating access by the airspace users to the very profitable Europe – North America markets. These transatlantic operations present a unique and concentrated traffic flow due to the nature of the airlines' schedules[15] and the varying wind conditions over the North Atlantic. Where possible, airlines typically plan their flights to avoid strong headwinds and benefit from tailwinds in oceanic airspace. However, staffing must be provided to cater for peak traffic volumes as the flight plan

[14] Airport Collaborative Decision Making

[15] Eastbound passenger flights typically depart North America in the evening and westbound flights typically depart Europe from mid-morning onwards.

routings are only known a matter of hours before each flight. Additionally, the reduction of aircraft separations in oceanic airspace in recent years has led to a concentration of traffic, both in time and airspace and this adds to the complexity of providing a safe and efficient ATM service to transatlantic flights in Irish controlled airspace.

6.54 ✂

6.55 ✂

6.56 The normal mechanism for managing such flows is ATFM capacity and/or staffing regulations when required. This mechanism cannot be used for the eastbound traffic flow as such flights are exempt from all ATFM measures. The strategic importance of transatlantic flights to the airline community also prevents the use of this option on westbound flights, except in very rare crisis or contingency situations. In summary the ATC capacity (expressed as the number of available ATC sectors) must be sized to cope with peak rather than average traffic demand.

6.57 In addition to providing ATM services in Irish controlled airspace, IAA ATCOs in the Shannon Air Traffic Control Centre provide an advance sequencing function (Extended Arrival Management) for some eastbound transatlantic traffic flows such as those to London's Heathrow and Gatwick airports.

6.58 Our ATCOs, in conjunction with NATS, dynamically reduce the speed of traffic bound for these airports while in Irish controlled airspace and cruising at optimum aerodynamic efficiency, thereby reducing the amount of time each flight spends in an inefficient configuration in a London hold. We anticipate that this type of operation will increase during RP3 as a result of the introduction of extended arrival management for at least 18 of the busiest European airports, as required by the EC's CP1[16] regulation. The IAA ANSP's Shannon ATCOs also provide optimum routings for flights wherever possible, thereby improving their economic and environmental efficiency by significantly reducing miles flown and fuel burn.

CCO/CDO

6.59 Over the course of RP3, the IAA ANSP intends to complete a lower airspace re-organisation and review of departure and arrival flight procedures for Irish airports. This will facilitate Continuous Climb and Descent Operations (CCO and CDO) at Irish airports to the maximum extent possible. CCO/CDO operations will result in significant fuel savings for airlines and reduced CO_2 emissions.

En Route: Capacity Targets for Ireland

6.60 The en route capacity targets for Ireland are set by the PRB to ensure IAA ANSP is incentivised to achieve a certain performance standard in terms of meeting demand during each year of the RP3 period. The targets are expressed in average minutes of delay per flight and are designed to relate to factors within the control of IAA ANSP such as its number of qualified controllers and the reliability of its technical services.

[16] Regulation (EU) 2021/116 on the establishment of the Common Project One supporting the implementation of the European ATM Master Plan provided for in Regulation (EC) 550/2004, amending CI Regulation (EU) 409/2013 and repealing CI Regulation (EU) 716/2014.

6.61 The targets can result in financial incentives and penalties being incurred depending on a given performance. However, as the PRB has acknowledged in March 2021 that the European network now has a costly excess of capacity, it follows that only financial penalties will be implemented should ANSPs not be in a position to meet demand in the remaining RP3 years.

6.62 There are several factors that can lead to IAA ANSP incurring unexpectedly high levels of traffic that can in turn lead to ATFM delays. One such example would be industrial action in neighbouring airspace but in situations such as this that are outside of our control, we would expect the relevant adjustments to be implemented in order to avoid IAA ANSP breaching a target and incurring an associated financial penalty. This is foreseen under the Network manager collaborative decision-making processes – "Post Ops Performance Adjustment Process"

6.63 While it is undisputed that the pandemic has led to excess capacity in the network since March 2020, it has been acknowledged by the European Commission that this must not lead to a situation later in RP3 or at the beginning of RP4 where there are insufficient resources to meet the key capacity and environment targets. While a recovery profile is uncertain, there is pent-up demand among passengers for travel and therefore a risk that capacity constraints around key locations or times could occur across the European network once travel restrictions are removed. This is a difficult area to solve and ANSPs need certainty from airlines with regard to their capacity requirements, while airlines need clarity from Governments' with regard to travel restrictions and passengers with regard to level of demand.

6.64 Due to the lead times involved in recruiting and training frontline ANSP staff, it follows that a decision on the required resources/capacity in 2024 needs to be made at the beginning of 2022.

6.65 With ANSPs being asked to prepare revised RP3 Plans on the basis of traffic Scenario 2 published by STATFOR in May, there is a real risk that traffic levels return faster than expected and cost containment measures in 2021 and/or 2022 restrict the ability of ANSPs to provide the required services in 2024. This problem of having insufficient resources in the future is exacerbated and extends into the RP4 period when one considers the onerous cost efficiency targets that are being proposed for the duration of RP3.

6.66 This problem is potentially further exacerbated when one considers the low probability of STATFOR's Scenario 2 from May being accurate. InterFAB has recently emphasised the great difficulty in forecasting traffic over the next 10 years with accuracy. It provides an example for Ireland whereby STATFOR provided a range of forecasts that represents almost 40% of total traffic over the period 2011-2019. This is reinforced by a recent statement from the European Council that it is not possible to predict when the period of depressed demand will end.

6.67 Notwithstanding the difficulty associated with forecasting traffic, IAA ANSP has estimated its resourcing requirement and overall cost base on the basis of STATFOR's Scenario 2. By 2024, we have identified a required increase in ATCOs of 6% compared to 2019 across terminal and en route services. We do not believe it is appropriate to compare resources in 2019 and 2024 solely from the perspective of traffic as IAA ANSP will have additional ATCO requirements for compliance/safety duties in addition to a new ATC tower that was not in place in 2019. To put it another way, if the IAA only had an allowance for the same level of ATCOs as 2019, then it would not be in a position to manage 2019 levels of traffic in 2024. This would result in a likelihood of delays or other impacts on service.

6.68 This Business Plan has been developed to ensure that IAA ANSP can meet the RP3 targets on both capacity and environment, which were revised by the PRB in March 2021.

6.69 In the event that Ireland's Performance Plan for RP3 does not reflect the required cost trend identified in this Business Plan, it follows that IAA ANSP will not be in a position to meet its capacity and environment targets over the period 2022-24 and with knock on implications for the beginning of RP4.

6.70 The capacity performance in the 2020-21 period is expected to meet the PRB targets but there are many factors that will greatly impact on our ability to meet the 0.03-minute target over the period 2022-2024 and from 2025. These include:

- A lower number of en route sectors being available to meet increasing demand
- An insufficient number of trained/qualified ATCOs to meet competing frontline and operational support requirements
- A failure to recognise the implications of a sizeable retirement profile for the business over the medium term and our current plans to address this future deficit
- Industrial Action as a result of regulatory imposed cost restrictions

IAA ANSP is therefore requesting that the NSAs and its customers acknowledge this significant risk to future capacity levels that are associated with excessive cost containment during RP3. It is a problem that may not crystallise until the latter years of RP3 and the early years of RP4 but one that needs to be remedied in the 2021 Plan.

Table 4 Draft Capacity Targets (March 2021) En Route ATFM delay per flight

	2020	2021	2022	2023	2024
National Reference Value	0.07	0.07	0.07	0.04	0.03
National Targets	0.07	0.07	0.07	0.04	0.03
Revised PRB Proposed Value (Mar'21)	0.07	0.01	0.03	0.03	0.03
Actual Performance	**0.00**				

6.71 ✂.

En Route: Environment Targets for Ireland

6.72 There are also knock on implications for the environmental targets as IAA ANSP would have to reroute a considerable volume of its traffic in the event that its required frontline resources are not recognised and accepted by the NSAs, our customers and the PRB on behalf of the European Commission.

6.73 With the environmental footprint of aviation already in the spotlight with other sectors, it is not in the interest of IAA ANSP, the NSAs or airspace users to have a situation whereby the horizontal flight efficiency is deteriorating as a result of future capacity constraints. In 2020 IAA achieved the revised horizontal flight efficiency target that had been proposed by PRB for the remainder of RP3. The significant drop in traffic in 2020 and its composition (lower proportion of south < > north overflights) contributed to this.

6.74 By extension and given the revised draft targets there is a risk that IAA ANSP will not meet its environmental targets during RP3 as a result of implementing decisions that assist neighbouring ANSPs to deal with their own bottlenecks. In this regard, we can also be affected by FRA decisions in neighbouring airspaces during RP3 – decisions that are currently not possible to anticipate. The

methodology used by the PRU to calculate horizontal flight efficiency (comparing distance flown with distance achieved towards destination) is also dependent on the absence of any routing restrictions in downstream airspaces. Therefore, any delay in the implementation of full cross-border FRA and or existence of downstream routing restrictions will jeopardise the ability of IAA to achieve the very challenging proposed target.

Table 5 Draft Environment Targets (March 2021) Horizontal en route flight efficiency (KEA)

	2020	2021	2022	2023	2024
National Reference Value	1.56%	1.54%	1.53%	1.53%	1.53%
National Targets	1.56%	1.54%	1.53%	1.53%	1.53%
Revised PRB Proposed Value (Mar'21)	1.56%	1.13%[17]	1.13%	1.13%	1.13%
Actual Performance	**1.13%**				

6.75 The PRB has calculated the environment targets for Ireland on the basis of historic performance and feedback from stakeholders but this has led to targets being proposed that are fundamentally flawed and not achievable as they do not consider the fact that the lower value achieved in 2020 is directly linked to the lower level of traffic as well as the implications of onerous cost efficiency targets on required resources.

6.76 During RP2 the KEA achieved reduced from 1.3% in 2015 to 1.24% in 2019. This has been achieved as a result of the implementation of comprehensive Free route airspace in Irish airspace at an early stage. Any further improvements are dependent upon the introduction of full FRA in neighbouring airspaces and implementation of cross border FRA between Ireland and adjacent airspaces. IAA ANSP is fully ready to implement cross border FRA as soon as our adjacent partners are in a position to do so.

6.77 The further reduction to 1.13% in 2020 took place during an exceptional period. The traffic mix in Irish airspace significantly changed during 2020 with a much larger decrease in north <> south traffic (e.g. UK/Scandinavia <> Iberian Peninsula and Canaries) and international arrivals and departures, than in East <> West transatlantic traffic. The latter traffic flow typically has more efficient routings as they are generally not subject to any routing constraints that would affect their KEA. The return to more normal traffic levels and traffic patterns will inevitably result in a deterioration of the current KEA. The methodology used by EUROCONTROL PRU for the calculation of the KEA, based on distance achieved towards aerodrome of destination at entry point and exit point compared to great circle distance from entry point to destination also means that airlines who elect to avail of the lower en route charges in flying via Irish and oceanic airspace will have higher KEA than if these flights were to follow the shortest available route.

[17] On June 2nd the Commission published Implementing Decision (EU) 2021/891 (attached). Recital 15 states, *"In light of the lower traffic levels expected over RP3, which should enable additional flight efficiency improvements, the Union-wide performance targets in the key performance area of environment for the years 2021 and 2022 should be revised in order to further reduce the ATM impact on environmental performance. The targets for the years 2023 and 2024 should however be maintained, considering the expected recovery of air traffic towards the end of RP3 as well as the impact on horizontal flight efficiency of elements which are beyond the control of air navigation service providers, including the flight planning and operational decisions of airspace users."*

Terminal

6.78 Dublin Airport witnessed very significant traffic growth during RP2 with flights increasing by 21.4% to 232,138 between 2015 and 2019. Much of this growth occurred during off-peak and shoulder periods of the day as the peak periods were operating at very close to capacity in 2015.

6.79 By 2018, traffic had increased to such an extent that the limits of the aerodrome's capacity during the peak daytime period (06h00 to 18h00) were reached. This pushed all additional flights into later, previously quieter hours. Despite the cap on peak time operations, and the efforts of the ANSP and other stakeholders, the level of delays at Dublin due to lack of airport capacity increased during RP2.

6.80 The "Arrival Sequencing and Metering additional time (ASMA)"18 as measured by the EUROCONTROL PRU, dis-improved from 2.67 minutes per flight in 2016 to 3.29 minutes in 2019. This was the third highest of all measured European airports.

Table 6 ASMA 2019 - Source EUROCONTROL PRU

Airport	Total
London - Heathrow	7.01
London - Gatwick	4.56
Dublin	3.29
Zürich	2.91
Lisbon	2.75
Milan - Malpensa	2.59
Barcelona	2.58
Catania	2.23
Frankfurt	2.17
Vienna	2.13

6.81 The reason for this increase in ASMA is that traffic increased by 21.4% at the airport during RP2 with no improvement in the airport runway and taxiway infrastructure. The IAA has highlighted concerns in this area to the relevant stakeholders for some time. Quite simply, the demand for arriving traffic at Dublin exceeded the capacity of the runway to facilitate "straight in" approaches by aircraft during most of the day.

6.82 This resulted in an increase in the number of aircraft that had to be instructed to utilise the Point Merge linear holding procedures that are designed to meter approaches to the runways so as not to exceed their capacity. The ASMA figure for Dublin Airport equated to approximately 385,000 minutes of airborne delay for arriving flights in 2019.

[18] The additional ASMA time is a proxy for the average arrival runway queuing time for inbound traffic flow, during congestion periods

6.83 Another indicator of airport ATM performance is the additional taxi-out time which is a proxy for the average departure runway queuing time for outbound traffic. Most of the factors influencing additional taxi-out time are related to aerodrome infrastructure rather than ATM capacity. For example, congestion at the runway in use adds significantly to this indicator.

6.84 Again, traffic increased by 21.4% at Dublin Airport during RP2 with no improvement in the airport runway and taxiway infrastructure, leading to much of this congestion. EUROCONTROL's PRU reported that this figure dis-improved at Dublin Airport from 5.03 minutes per flight in 2016 to 7.10 minutes in 2019. In 2019, Dublin had the fourth highest additional taxi-out time of all European airports as a direct result of the infrastructure deficiencies.

Table 7 Additional Taxi-Out Time 2019 - Source EUROCONTROL PRU

Airport	Total
London - Heathrow	8.97
London - Gatwick	8.94
Rome - Fiumicino	7.87
Dublin	7.10
Milan - Malpensa	4.76
Barcelona	4.48
London - Stansted	4.42
London - Luton	4.13
Madrid - Barajas	4.01
Lisbon	3.96

6.85 The commencement of parallel runway operations in late 2022 will undoubtedly result in very significant reductions in both ASMA and Additional Taxi-Out Time at Dublin and provide significant scope for traffic growth well beyond RP3. It must however be understood that to facilitate the operation of this new runway configuration during the hours planned by Dublin Airport, additional ATCOs will be required. The requirement of a new runway required the IAA to develop the new tower and have it fully operational (tested, training etc) in advance of the second runway being operational. This had obvious implications for RP2 and is a cost driver for terminal services in RP3. However, it is a significant long-term investment and will be a significant enabler of additional capacity at Dublin Airport for many years to come.

6.86 Parallel runway operations will require 14 additional ATCOs in 2023 and 2024, when Dublin Airport expects it to be operational 18-hours per day. Parallel runway operations will also require the development and implementation of new operating procedures and the development and delivery of an associated ATCO training programme.

6.87 Parallel runway operations effectively require similar operational resources to operations at two separate airports, with the added complication of having to coordinate movements between them. The physical distance between runways means that an ATCO cannot safely monitor and control operations on both at the same time. This dictates that a separate ATC control position

for each runway must be staffed by an appropriately rated ATCO at all times of parallel runway operations. Despite the unquestionable increase in capacity that the new runway will provide, the airport will continue to have a complex and constrained taxiway and stand infrastructure for the foreseeable future.

6.88 The scale and complexity of the apron/ramp and taxiways at Dublin Airport has for some time now, required two ground control ATCOs during peak times to ensure the safety and efficiency of operations. During parallel runway operations, separate and distinct ground ATC positions, manned by appropriately rated ATCOs will be required at all times to ensure the safe and orderly movement of aircraft on the ground (clearance delivery and ground movements controllers). The complexity arising from these numerous control positions in a dual runway airport requires an active coordination function, which must be manned by an appropriately rated ATCO. This operating model is not specific to Dublin Airport but is replicated across European airports of similar scale and complexity. The staffing requirements set out in the IAA ANSP's Business Plan are fully consistent with best practice at those European airports of similar scale and complexity.

6.89 The provision of sufficient capacity at Dublin Airport will not only facilitate future growth but will also deliver significant environmental benefits. Reduced ASMA and additional taxi-out times and new parallel runway operating procedures will lead to reductions in noise and CO_2 emissions. This will result in reduced fuel bills for airlines along with improved operational efficiency and reductions in maintenance costs due to reduced flight times. Emissions cuts will also help the airport become an even better neighbour to the surrounding communities.

6.90 The ANSP also provides ATM services at Cork and Shannon airports[19]. ATCO staffing is not only dependent upon the levels of traffic, but it is also dependent on the H24 nature of these airports. The IAA ANSP's staffing proposals for these airports reflect this requirement.

Terminal: Capacity Targets for Ireland

6.91 The PRB does not prescribe targets to European airports across the network. Dublin Airport is the only airport in Ireland where Capacity Targets are in force and this affects the national targets, which is invariably lower due to the status of the other airports.

6.92 The capacity targets for Terminal activity in Ireland are primarily driven by matters pertaining to aerodrome capacity and adverse weather. Therefore, irrespective of the effects of the pandemic, IAA ANSP is of the view that the below targets remain relevant for the RP3 period.

6.93 The capacity targets for Dublin in the original RP3 Plan took into account the availability of the parallel runway from 2022. However, as demand will remain suppressed in 2022, we believe this target remains appropriate even though the parallel runway is not expected to become operational for a full calendar year until 2023.

[19] The provision of air traffic services to the Atlantic Flight Training Academy (AFTA) in Cork is noteworthy, with airspace users such as British Airways and Air France currently availing of this service as newly recruited pilots undergo the necessary training.

Table 8 Capacity KPI #2: Terminal and Airport ANS ATFM delay per flight

	2020	2021	2022	2023	2024
EIDW-Dublin	0.25	0.25	0.20	0.20	0.20
Airport contribution to national targets	0.20	0.20	0.15	0.15	0.15
Actual EIDW-Dublin 2020	0.14				
Actual Performance (National)	0.11				

6.94 Weather was the reason for 73% of the 2020 delay and 27% was due to aerodrome capacity. Over the 5-year RP2 duration the respective percentages were 67% and 31%. This indicates that the low/ zero level of delay due to ATM capacity or other issues. Put differently this is indicative of the high quality service offered.

6.95 A significant proportion of ATFM arrival delays due to weather (i.e. requirement for increased separation between flights) will be avoided provided parallel runway operations and the associated staffing is available.

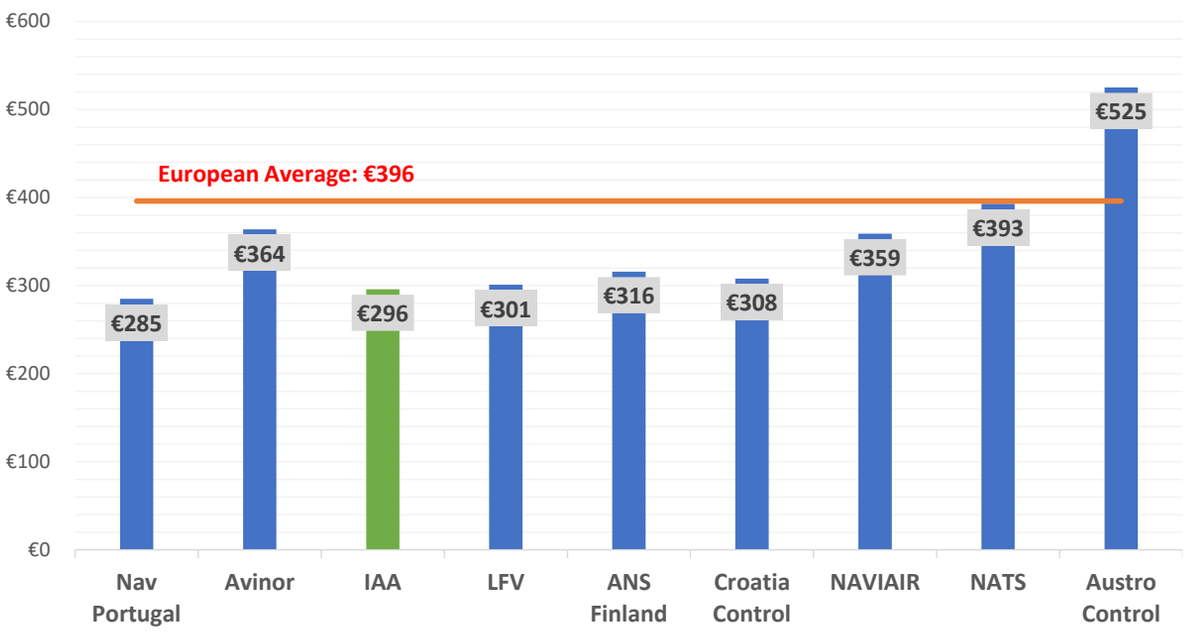
6.7 Cost Efficiency

The ACE 2019 report was published in May and it confirms the IAA ANSPs strong performance and continued cost efficiency against a range of metrics. The 2019 report is particularly significant as it indicates the very efficient position of the IAA ANSP at the end of RP2 and entering into the RP3 period.
ACE 2019 compared to ACE 2018

	2018	2019	% Change	Ranking [38 ANSPs]
Economic gate-to-gate cost effectiveness				
European Average	€509	€508	-0.2%	
IAA	€315	€303	-3.8%	7th
ATM/CNS provision costs per composite flight hours				
European Average	€389	€396	1.8%	
IAA	€306	€296	-3.3%	10th
ATCO hour productivity (gate-to-gate)				
European Average	0.93	0.94	1.08%	
IAA	1.09	0.99	-9.2%	15th
ATCO employment costs per ATCO hour (gate-to-gate)				
European Average	€115	€119	3.48%	
IAA	€99	€101	2.02%	18th
ATCO employment costs per composite flight hour				
European Average	€125	€127	1.6%	
IAA	€91	€102	12.1%	14th
Support costs per composite flight hour at ANSP level				
European Average	€265	€269	1.5%	
IAA	€215	€194	-9.8%	8th

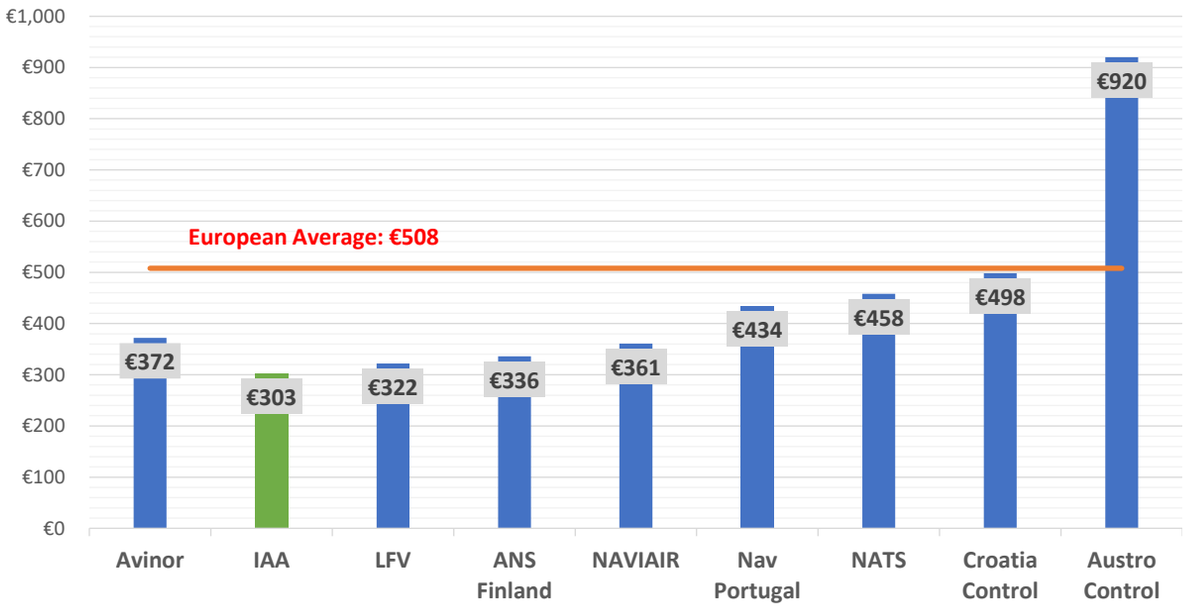
- ✓ IAA performs better than European average in **all** KPIs
- ✓ IAA represents 1.35% of European system gate-to-gate ATM/CNS provision costs

ATM/CNS provision cost per composite flight hour (cost of service provision)[20]



- IAA 25% lower than Euro. Average
- 10th lowest in Europe

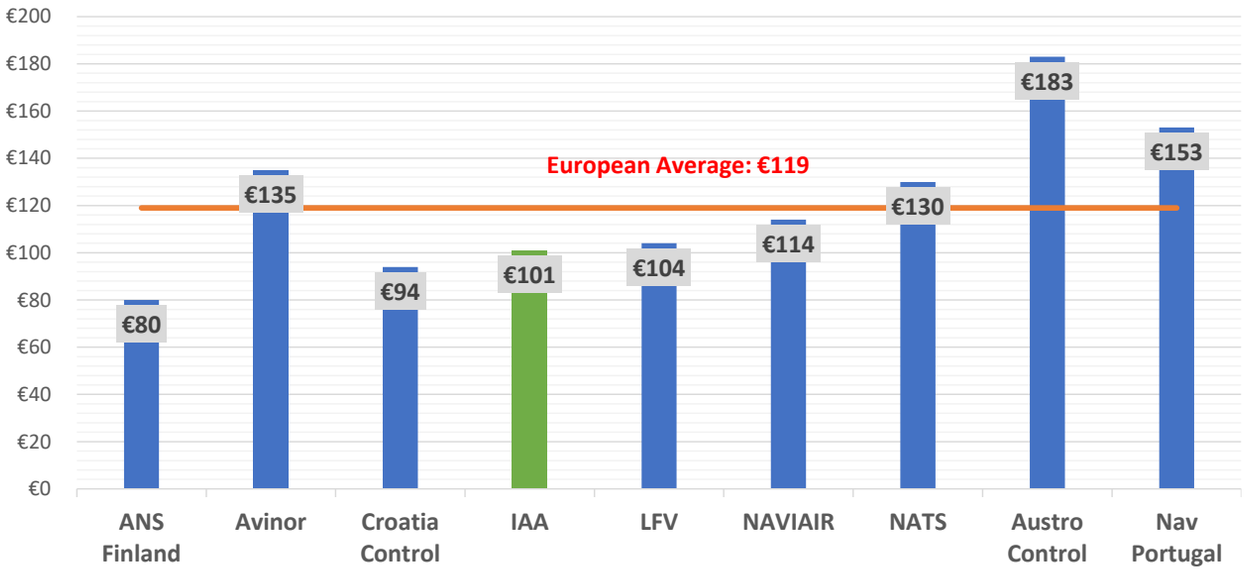
ANS cost (ATM/CNS cost + ATFM Delay cost) per composite flight hour (economic cost)



- IAA 40% lower than Euro. Average
- 7th lowest in Europe

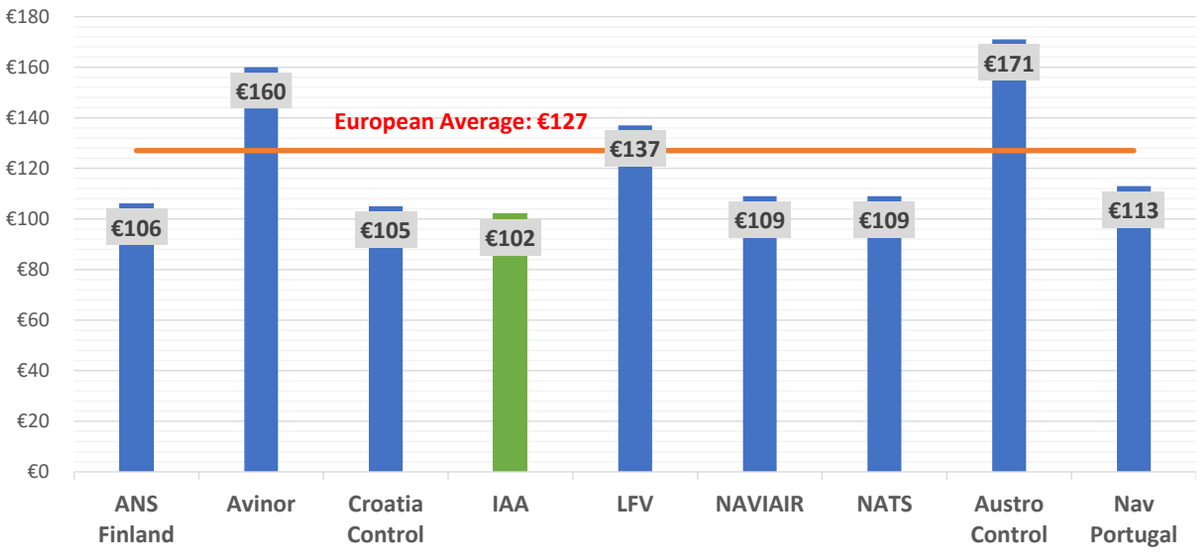
[20] This section expands upon the RP3 comparator group to include neighbouring ANSPs in addition to COOPANS partner ANSPs.

Cost per hour of ATCO activity



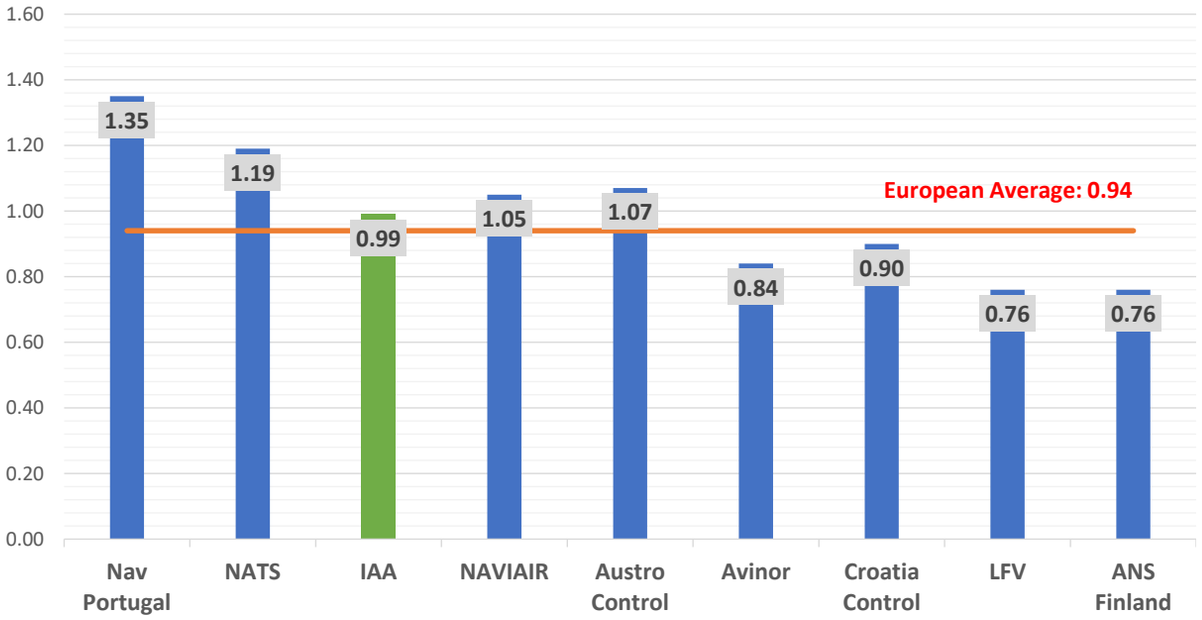
- IAA 15% lower than Euro. Average
- 18th highest in Europe

Cost per composite flight-hour



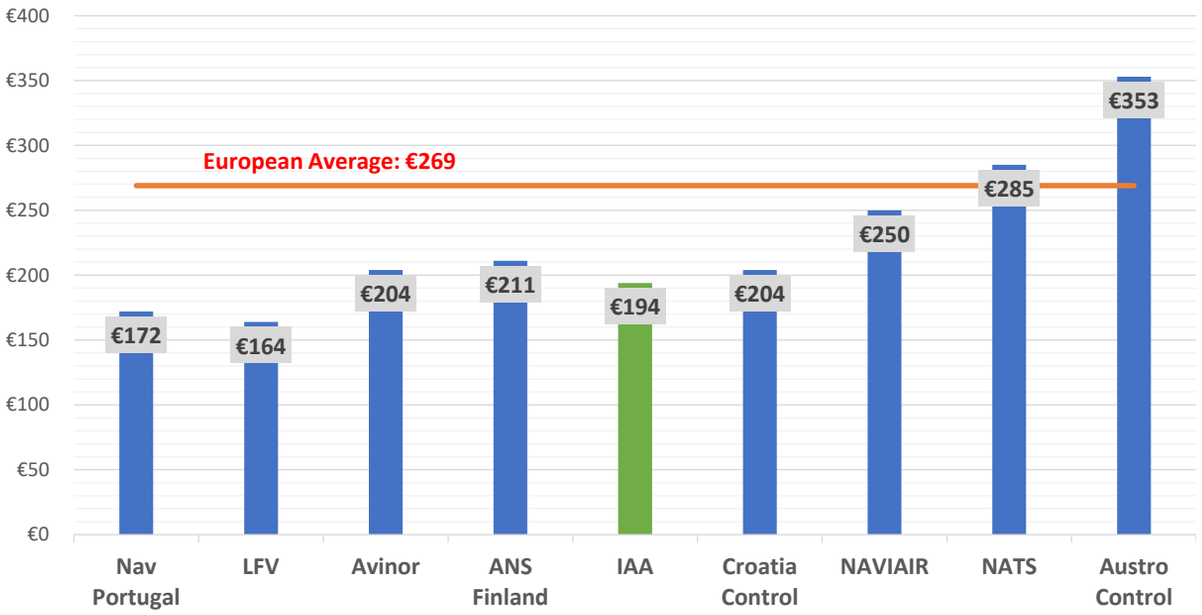
- IAA 20% lower than Euro. Average
- 14th lowest in Europe.

Number of flight-hours controlled per ATCO-hour



- IAA 5% above Euro. Average
- 15th highest in Europe

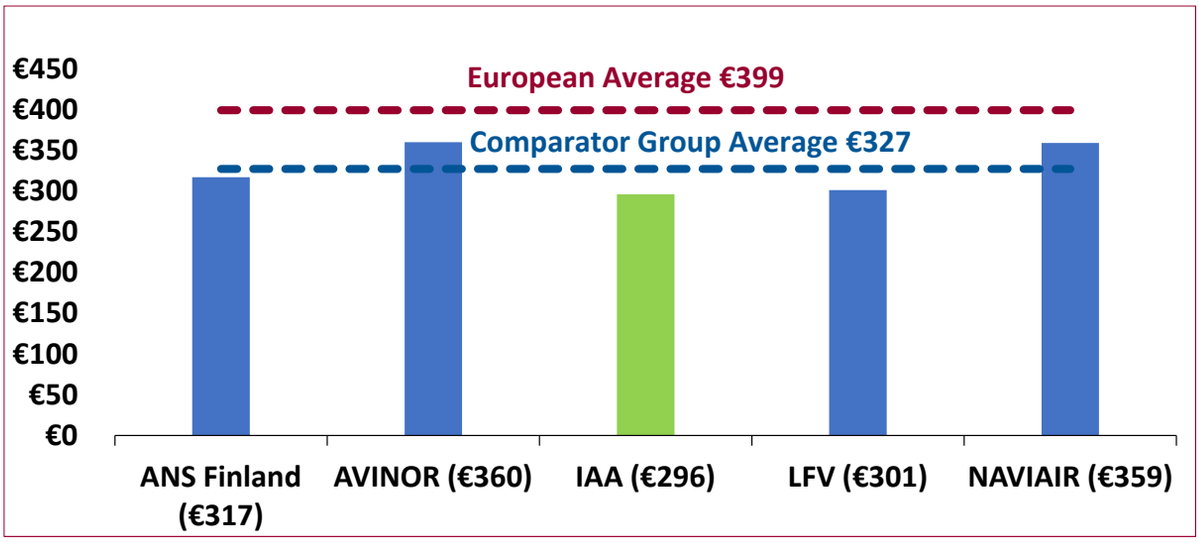
Support costs per composite flight hour. Includes: Non-ATCO staff costs, non-staff costs, capital related costs and exceptional costs.



- IAA 28% lower than Euro. Average.
- 8th lowest in Europe

ATM Cost Effectiveness (ACE) Report for 2019: Preliminary Data from December 2020

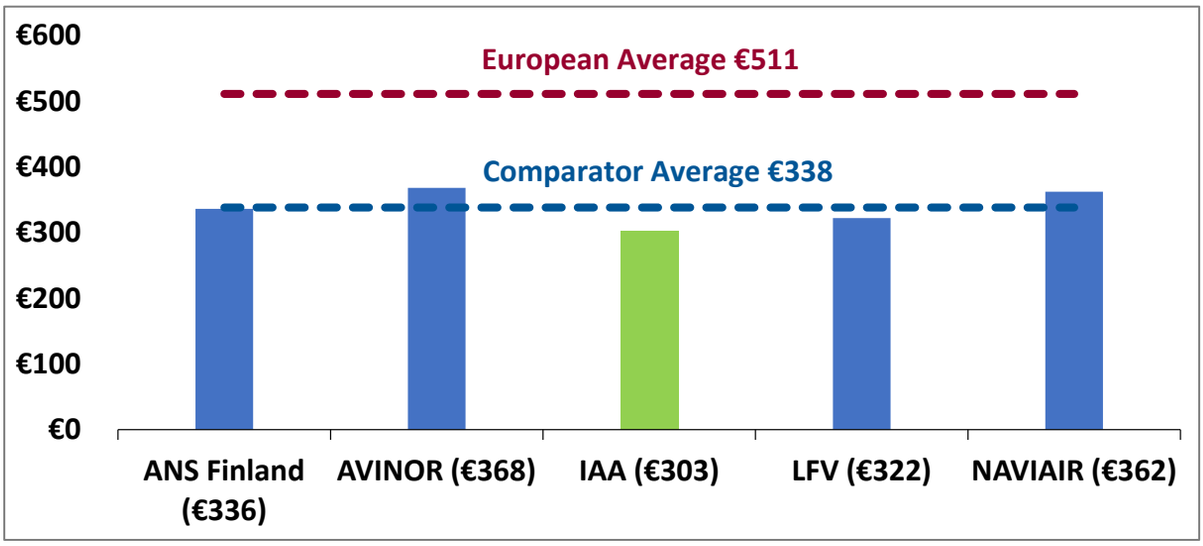
Figure 13 ATM/CNS provision cost per composite flight hour



6.96 This data captures the financial effectiveness of ANSPs by looking at the overall cost of service provision. The costs of the IAA in 2019 were almost 10% lower than the average of the RP3 Comparator Group and lower than the other four ANSPs in this group.

6.97 The IAA's cost of service provision was more than 25% lower than the European average, which stood at €399.

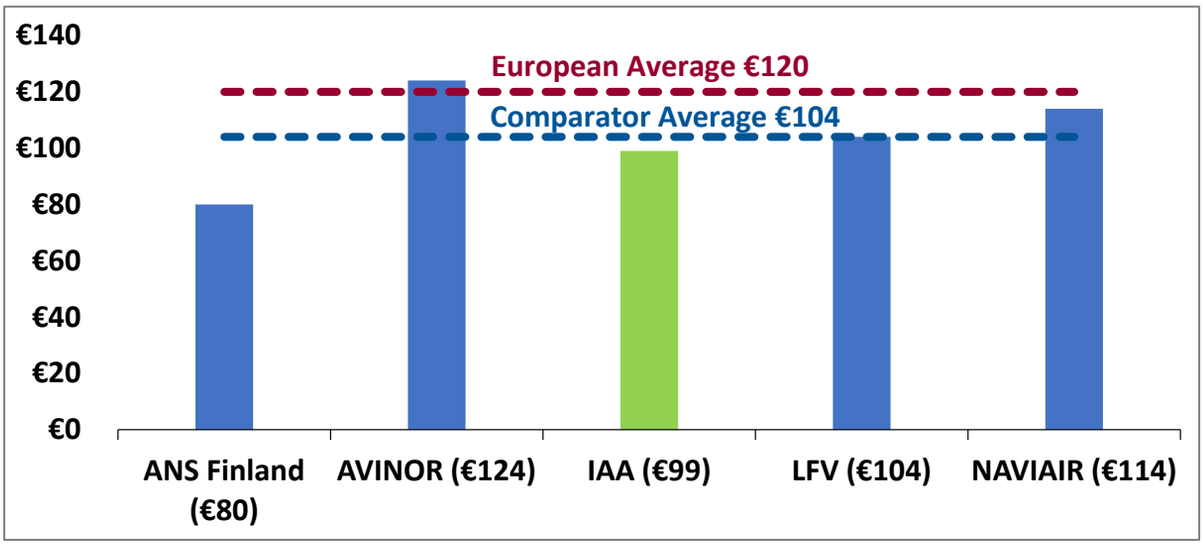
Figure 14 ANS Cost Per Composite Flight Hour



6.98 This represents the economic cost effectiveness of ANSPs in 2019 by combining the ATM/CNS cost with the cost of ATFM delay. The costs of the IAA in 2019 were approximately 10% lower than the average of the RP3 Comparator Group and lower than the other four ANSPs in this group.

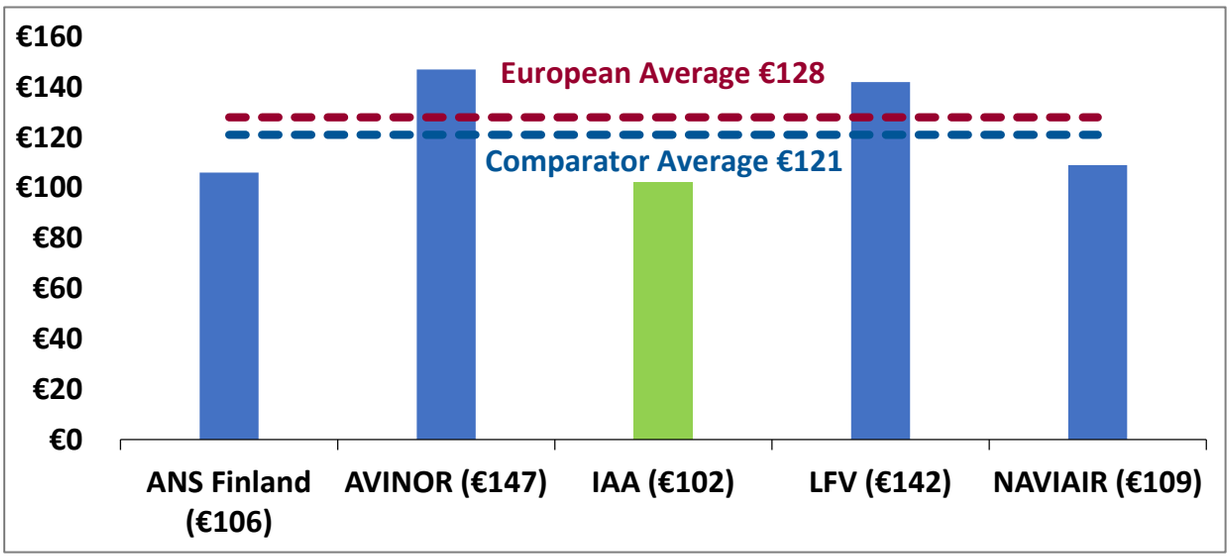
6.99 The IAA's cost of service provision was more than 45% lower than the European average, which stood at €511.

Figure 15 ATCO Employment Costs: Cost per hour of ATCO activity



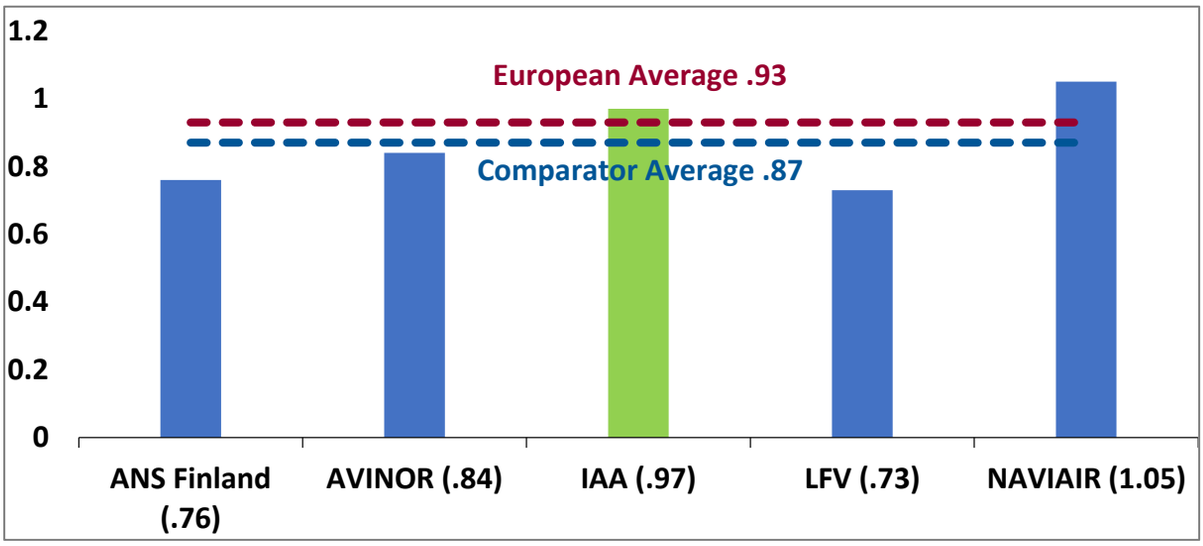
6.100 There is only one ANSP in the RP3 Comparator Group (ANS Finland) that has lower ATCO employment costs compared to IAA ANSP. Our ATCO cost per hour of activity was 5% lower than the RP3 Comparator Group average in 2019 and almost 18% lower than the European average.

Figure 16 ATCO Employment Costs: Cost per composite flight hour



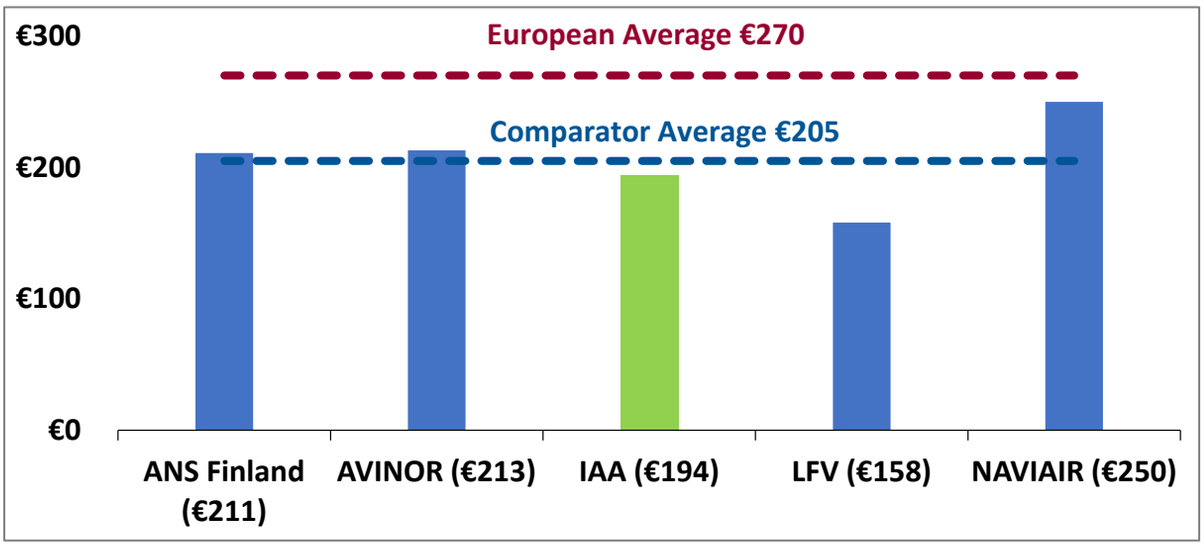
6.101 When ATCO Employment Costs are assessed by composite flight hour, IAA ANSP had the lowest costs in the RP3 Comparator Group with the level 15% lower than the group average. The costs were approximately 20% lower than the European average.

Figure 17 ATCO Productivity: No. of flight-hours controlled per ATCO-hour



6.102 As set out above, IAA ANSP was more productive than the RP3 comparator average and the European Average having had 0.97 flight-hours controlled per ATCO-hour compared to 0.93 on average across Europe and 0.87 on average in the RP3 Comparator Group.

Figure 18 Support Costs (per composite flight hour)



6.103 This includes Non-ATCO staff costs, non-staff costs, capital related costs and exceptional costs. While the Swedish ANSP had the lowest support costs in the RP3 Comparator Group, IAA ANSP incurred support costs that were 5% lower than average cost within the RP3 Comparator Group and 20% lower than European ANSPs as a whole.

6.104 In summary, IAA ANSP is already efficient compared to its RP3 comparators. Clear efficiencies were achieved in RP2 ahead of RP3 – it is therefore essential to recognise the extant level of efficiency and the key cost drivers outlined in the Plan in order to ensure the service provision is not degraded in any manner.

6.8 Interdependencies and Trade-Offs

6.105 The KPAs covered by this business plan should not be considered as stand-alone. It should be recognised that performance in one area will affect performance in other areas. The links between the KPAs and the resulting trade-offs in terms of performance is a critical aspect of this Plan. Changes in one KPA target area (e.g. cost efficiency) can adversely affect the achievement of KPA targets in another e.g. capacity/delays. The IAA has designed this plan to deliver a continued high standard of performance and we have clearly highlighted the risks and consequences if cost allowances do not provide for the operational outcomes that are required.

6.9 Safety and the other KPAs

6.106 The level of ANS safety required under EU legislation will not be subject to such trade-offs under any circumstances. The provision of air navigation services in a safe way is an overriding objective and safety is fully embedded into our business plan. Where interdependencies arise between safety and the other three KPAs (cost-efficiency, capacity and the environment), these will be effectively managed so as not to compromise the required level of safety. In other words, safety is always prioritised by the IAA, but this means that the three other KPAs may be impacted. In advance of implementation, all new and/or improved processes, procedures and technology will be subject to the rigorous application of the IAA's Safety Management System (SMS) and will benefit from the oversight of the Safety Regulation Division. This approach has served the IAA and our customers well to date and will continue to do so in the future. However, safety has a cost and more onerous regulatory standards in RP3 has to be accounted for, as well as the baseline cost associated with safety that has been delivered in RP2.

6.10 Capacity and Cost-Efficiency

6.107 En-route Air Traffic Flow Management delays in Irish controlled airspace were extremely low during RP2 despite traffic growth which has been far in excess of the levels forecasted in our RP2 plan. The IAA is relying on guidance from STATFOR projections with en-route traffic levels under Scenario 2 expected to exceed 2019 levels by 2024. Resources are a key element in the achievement of the targets set in all areas, particularly capacity. Our 2024 staffing levels are consistent with the staffing levels of 2019 when parallel runway operations at Dublin and increased resourcing of safety and regulatory are considered.

6.108 ✂

6.109 In January 2021, Henrik Hololei, Director General of the European Commission's DG MOVE said in an interview hosted by EUROCONTROL that ANSPs should prepare for the future and be ready to deliver when we are back to normal. He said that ANSPs should make sure that enough ATCOs are trained and available to deliver services when needed.

6.11 Capacity and Environment (flight efficiency)

6.110 Our en-route airspace is Free Route (FRA) and as a result our en-route flight efficiency values are extremely efficient. FRA in the Shannon FIR has been delivering significant environmental and efficiency benefits to airlines since 2012 and will continue to do so throughout RP3. While this is an existing and continuing efficiency, it must be remembered that while the IAA was one of the first ANSPs to deliver FRA, it is still not implemented everywhere across the European network almost 10 years later. Our performance was improved by the extension of FRA below FL245 in 2017. Further improvements in our en-route flight efficiency are largely dependent on the introduction of FRA in our neighbouring SPs and with the accompanying system upgrades to enable full cross border FRA. NATS are planning to introduce FRA on a phased basis from December 2021 and the IAA will fully cooperate with this introduction. This will eventually lead to reduced nautical miles flown with associated environmental improvements. The IAA SP is also working on increasing the availability of CCO/CDO operations at Irish airports.

6.111 As explained above, any implementation of flow measures and/or routing restrictions within and/or around Irish controlled airspace due to a lack of capacity will adversely impact our environmental performance and will cause the IAA SP to fail to meet its RP3 environment targets. East bound transatlantic flights may not be subjected to ATFM measures as the European ATFM mandate only applied to flights departing from within the EUROCONTROL area (and a small number of cooperating states to the east). In the event of a capacity shortfall some flight planning restrictions would require to be imposed on such traffic flows to reduce potential congestion in Irish airspace. Such restrictions would limit the choice of entry points and routings available. Such routing restrictions would also need to be applied to north <> south overflying traffic to reduce the complexity of traffic flows. Both these methods would result in additional track miles for the flights concerned with a consequent deterioration in the KEA and KEP.

Key Points to note in relation to the Performance of IAA ANSP
1. This Plan includes a baseline of costs involved in all aspects of safety including monitoring, checking, training, systems, data analysis, promotion and safety intelligence
2. Due to the lead times involved in recruiting and training frontline ANSP staff, it follows that a decision on the required resources/capacity in 2024 needs to be made at the beginning of 2022
3. All stakeholders need to recognise the significant risk to future capacity levels that are associated with excessive cost containment during RP3
4. The PRB has calculated the environment targets for Ireland on the basis of historic performance and feedback from stakeholders but this has led to targets that are fundamentally flawed as they do not consider the implications of onerous cost efficiency targets on required resources
5. From a cost efficiency perspective, it is essential to recognise the extant level of efficiency and the key cost drivers outlined in the Plan in order to ensure the service provision is not unduly degraded

7. Required Costs 2020-24

7.1 Overview

7.1 IAA ANSP successfully achieved all its Single European Sky KPI targets during RP2. This performance was particularly notable in 2019 as:

- record traffic levels were safely handled
- negligible en-route ATFM delays recorded
- the IAA SP increased the number of CCO/CDO operations at regulated airports
- the IAA SP achieved its best horizontal flight efficiency (KEA) performance of RP2
- Unit rates were amongst the lowest across Europe in RP2 indicating value for money

7.2 This performance was achieved even though traffic levels remained above the STATFOR High[21] Growth forecast throughout RP2. However, such a stellar performance resulted in significant CAPEX underspend as resources were diverted to service delivery and much increased reliance on overtime and annual leave accumulation. The STATFOR Scenario 2[22] traffic forecast indicates that by 2024, IFR movements in Irish controlled airspace will exceed 2019 levels.

7.3 On the basis of this projected growth of traffic, the costs required by IAA ANSP for RP3 *(2017 prices)* amount to €511.7 million for en route and €132.4 million for terminal. Included in these totals are €7.6 million for en route and €1.5 million for terminal relating to the costs to be incurred by the ANSP from the proposed restructuring of the IAA.

7.4 The year 2020 is the actual costs incurred. For the years 2021 to 2024, the IAA's 2021 approved operating and capital budgets are the starting point for this plan adjusted for actual payroll phase 3 cost containment measures.

Table 9 En Route Cost Requirement 2020-2024

2017 prices	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 Total**
Staff costs	57,819	54,541	49,598	59,979	62,297	64,686	**291,101**
Other operating	23,990	21,696	27,899	34,336	35,395	34,469	**153,795**
Depreciation	7,647	6,606	7,845	9,910	11,342	11,084	**46,787**
Cost of Capital	2,962	1,846	3,214	4,020	4,916	4,823	**18,819**
Exceptional items*	0	0	✂	0	0	0	✂
Total	**92,418**	**84,689**	✂	**108,246**	**113,949**	**115,062**	✂

* Included in exceptional items is a cost for VSS and VER in May 2021.

[21] The IAA RP2 plan was based on the STATFOR Base traffic forecast level
[22] May 2021

Table 10 Terminal Cost Requirement 2020-2024

2017 prices	2019 €'000	2020 €'000	2021 €'000	2022 €'000	2023 €'000	2024 €'000	RP3 Total
Staff	9,731	9,188	8,311	10,254	10,610	10,902	49,265
Other operating	7,705	4,754	6,389	7,879	8,151	7,909	35,081
Depreciation	2,960	2,477	3,965	6,470	7,711	8,178	28,801
Cost of Capital	1,272	732	2,536	4,907	5,465	5,574	19,214
Exceptional items*	0	0	✂	0	0	0	✂
Total	**21,668**	**17,151**	✂	**29,509**	**31,937**	**32,563**	✂

* Included in exceptional items is a cost for VSS and VER in May 2021.

7.5 ✂

7.6 Staff costs in 2021 take account of the COVID-19 phase 3 cost savings measures agreed with IAA unions which provide for a banded pay cut of up to 10% for the year. Pay is restored in 2022. In line with recent Revenue guidance, the Employment Wage Subsidy Scheme (EWSS) is forecast to remain in place until 30 June 2021. ✂

7.7 ✂

7.8 ✂

7.9 In May 2021, EASA published guidelines in relation to the COVID-19 pandemic and specifically on the Maintenance of ATCO skills[23]. It advises that during periods of low traffic ANSPs should organise refresher training on synthetic training devices for operational matters such as procedures and recent changes.

7.2 Headcount Requirements 2020-2024

7.10 The required headcount figures identified below are as of 31 December each year. Corporate Services and Operations Management and Support are stated at 100% but a portion of their time may be attributable to non-regulated activities, which is reflected in the allocation of staff costs.

[23] https://www.easa.europa.eu/sites/default/files/dfu/maintenance_of_atco_skills_-_easa_guidelines_in_relation_to_the_covid-19_pandemic_issue_1.pdf

Table 11 Headcount Requirements in RP3

	2019 A	2020 A	2021 F	2022 F	2023 F	2024 F
ATCOs	309	301	291	300	311	328
Engineers	72	73	84	90	93	94
Data Assistants	39	39	38	38	38	38
Ops Mgmt. & Support	60	60	64	68	69	69
Corporate Services	68	66	65	57	57	57
Total	**548**	**539**	**542**	**553**	**568**	**586**

7.11 From a low point in 2021, ATCO headcount will increase over the course of RP3 to meet the operational requirement to support increasing traffic, provide operational resilience and meet the demand for a new parallel runway at Dublin airport. The new runway brings with it a significant change to the IAA's staffing requirement, not only in terms of increased ATCOs but also increased numbers of engineers and operational support staff and increased workload for data assistants. An additional 14 ATCOs will be required to service the new runway for an 18-hour period from 2023.

7.12 New Regulations will require additional resources while the ANSP's capacity to deliver on safety work, ATM occurrence investigations, systems testing and validations, project work, on-the-job training and competency assessments will require the planned increases in headcount.

7.13 ✂

7.14 The IAA's air traffic controllers are, in the main, multi-rated, holding a minimum of two ratings each. This ensures that the ANSP can continue to operate in a flexible manner in delivering a high-quality service to its airline customers. This efficiency is not the norm in a European context and accordingly should be considered as a significant contribution from the IAA to achievement of the overall pan- European targets.

7.15 The IAA SP must also be mindful of the interdependence between staffing levels and safety, environmental performance and capacity. The IAA SP has conducted detailed planning of its ATCO staffing requirements during RP3. Given that the IAA SP will not compromise on safety, any shortfall in ATCO numbers below those levels planned for RP3, would introduce significant risk to the ongoing provision of the quality ATM/ANS services that our airline customers expect. With growing demands on our ATCO resources as explained in detail below, if we do not reach the ATCO numbers as planned over RP3, there will be implications for the continued delivery of operationally and environmentally efficient ATM services in Irish controlled airspace and at the three State airports. In addition, while safety is prioritised, it is noted that safety regulatory requirements continue to grow with the implementation of Regulation 2017/373. This means that the baseline cost and staffing requirements that delivered such a positive safety performance in RP2 have increased, in order to maintain and where possible improve, this performance.

7.16 While ATCO numbers have reduced in 2020 and further reductions are occurring during 2021 (e.g. retired staff that are not being replaced due to cost containment), the IAA SP plans to increase ATCO numbers from a total of 309 in 2019 to 328 by 2024. In addition to being required to deliver a safe and efficient ANS service, to conduct obligatory training programmes, to deliver key

projects and to provide essential support functions including but not limited to ATM Occurrence Investigation, Unit Competency Assessment etc., ATCO staffing levels over the course of RP3 are driven by a number of factors inter alia:

- Manning new ATCO positions required to facilitate Parallel Runway operations at Dublin Airport [commencing operations for 5 hours daily in late 2022 and operating for 18 hours daily from 2023]
- Traffic levels, which are expected to exceed 2019 traffic levels by 2024 based on Scenario 2 of the most recent STATFOR forecast
- An ongoing requirement to reduce the IAA SP's reliance on annual leave deferral and overtime to deliver ATM services while meeting our Fatigue Management obligations.
- Preparation of the IAA SP to safely and sustainably manage the significant number of ATCO retirements projected for RP4
- Increased Safety/Regulatory & Compliance staffing requirements
- Delivery of our CAPEX plan

7.17 The IAA has a strong track record of generating extremely low levels of en-route and terminal ATFM delays within Irish controlled airspace. However, our analysis of the potential impact of not reaching our planned staffing levels by 2024 concludes that it will inevitably negatively impact our ability to continue to provide the levels of service that our customers have come to expect and demand. Besides affecting our capacity to deliver our CAPEX plans and returning the IAA SP to increased reliance on overtime and annual leave accumulation, the regular imposition of ATFM delays during daily core hours would eventually become the norm with a resultant deterioration of our capacity and environmental performance inevitable. Such a development would be a retrograde step, not only for Ireland but also for the entire European network as ANSPs attempt to reach the RP3 capacity targets. For example, our analysis concludes that a shortfall of 8 ATCOs at the Shannon ACC would limit our ability to a maximum of seven[24] sectors. In 2019, eight High Level en-route sectors were regularly required to safely handle the summer traffic levels during the core hours. Based on current forecasts, these eight sectors will be required again at peak times by 2023 and required on a regular basis by 2024.

7.18 ✂

7.19 Routing restrictions within and around Irish controlled airspace will inevitably lead to the extension of flight routes and negatively impact our horizontal en-route environmental performance. In such circumstances, certain aircraft would be required to follow less efficient routings within and around Irish controlled airspace which is counter to the environmental benefits of Irish free route airspace [FRA] currently enjoyed by airlines. Such longer and less efficient routings will also have cost implications for our airline customers, in terms of fuel and ENR user charges, and will affect the ability of the overall European network to meet the capacity and environmental RP3 targets.

[24] The IAA SP utilises a "crew to workload" rostering principle and makes use of dynamic sectorisation rather than a fixed sector plan. Sectors are opened, combined and closed dynamically in response to traffic loadings, thereby closely matching capacity with demand.

7.20 Staff shortages at Dublin will limit our capacity to staff the additional positions required to safely operate parallel runway operations from 2023 onwards. The capacity and environmental effects of this are explained above.

Overview of RP3 ATCO Requirements

7.21 As set out above, air traffic levels are due to exceed 2019 levels by 2024 [Scenario 2].

7.22 The IAA SP is required, pursuant to Regulation (EU) 2017/373, to "ensure that it is able to provide its services in a safe, efficient, continuous and sustainable manner, consistent with any foreseen level of overall demand for a given airspace. To this end, it shall maintain adequate technical and operational capacity and expertise". EASA provide guidance on the definition of *technical and operational capacity* stating that it "should include a sufficient number of personnel to perform its tasks and discharge its responsibilities"[25].

7.23 Our *foreseen level of overall demand* is based on the STATFOR Scenario 2. The SP has conducted a detailed staff planning exercise, factoring in the RP3 performance targets, traffic forecasts, the retirement profile and the other non-operational functions which require ATCO resources. The requirement for Terminal and ENR service provision in terms of ATCO numbers is as follows:

Table 12 ATCO requirement by 2024

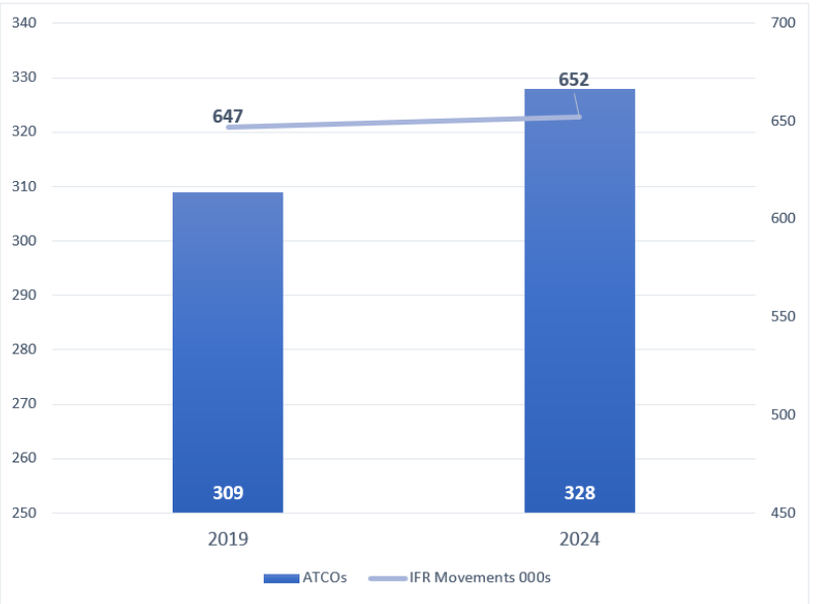
Year	2019	2020	2021	2022	2023	2024
ATCOs	309	301	293	295	311	328
IFR Movements	647,000	263,000	277,000	459,000	562,000	652,000

7.24 While air traffic levels are the key determinant of ATCO staffing requirements, there are a range of non-operational functions which the IAA SP also must perform. These non-operational functions include:

- Training [Regulation (EU) 2015/340]
- ATM Occurrence Investigation [Regulation (EU) 376/2014]
- Unit Competence Assessment [Regulation (EU) 2015/340]
- Safety [Regulation (EU) 2017/373]
- Projects [e.g. New Dublin Tower, etc.]
- Ongoing procedures development
- Attending and representing the IAA at International fora
- Liaising with other external stakeholders e.g. UK NATS, regional airports, Military, Airport Authorities etc.
- Attending meetings to provide expert input
- Professional development/ remaining up to date with best practice

[25] EASA Easy Access Rules for ATM/ANS (Regulation (EU) 2017/373): Annex III ATM/ANS.OR.B.001 Technical and Operational Competence and Capability

Figure 19 ATCO numbers and STATFOR Scenario 2 IFR movements



7.25 The 2024 ATCO figure reflects the most recent STATFOR traffic forecast. The revised May STATFOR figures forecast 2024 IFR movements of 652,000, or 101% of the 2019 total. This represents a 10% increase in forecasted traffic levels from the previous November 2020 STATFOR forecast. Consequently, the ATCO total has increased from 320 to 328.

7.26 The 2024 ATCO figure of 328 is effectively the same as the 2019 total when the following are considered:

- 309 ATCOs [the same figure as 2019] *plus*
- 14 ATCOs for 18-hour parallel runway operations at Dublin
- 3 ATCOs for safety & regulatory compliance work
- 2 ATCOs for the development and ongoing maintenance of a training programme for all staff within the ANSP.

7.27 It is important to note the following in relation to 309 ATCOs in 2019:

- record traffic levels were safely handled [647,000 IFR movements],
- all RP2 SES KPI targets were achieved:
  - Safety
  - negligible en-route ATFM delays recorded
  - the IAA increased the number of CCO/CDO operations at regulated airports
  - the IAA achieved its best RP2 horizontal flight efficiency (KEA) performance
- overtime hours [-36%] and annual leave deferral rates [-9%] started to decline following years of steady increase[26]

[26] A certain level of overtime is inevitable as Operations crews to workload and overtime is used to cover, where necessary, unplanned staff shortages due to sickness, absences associated with EASA vaccination requirements, etc., otherwise service provision would be liable to short notice interruptions. Annual leave is granted when available staffing levels are above the minimum required to safely provide our services. The IAA SP does not maintain a

- certain CAPEX projects were progressed

7.28 This high standard of performance, which has come to be expected by airline customers, will not again be possible in 2024 without reaching our planned ATCO levels. The IAA's high standard of performance is of particular importance to the wider European network ensuring that traffic coming off the North Atlantic is filtered efficiently with no delay to its European destination and westbound traffic is efficiently delivered to the North Atlantic. The knock-on impact of delays in Irish airspace would be significant for the European network. Accordingly this delay-free service and efficiency is a key contribution of the IAA ANSP to the wider European targets.

Primary Drivers of RP3 ATCO Requirements

Regulation (EU) 2017/373

7.29 Regulation (EU) 2017/373 came into effect at the beginning of 2020 and has led to a significantly higher demand on resources (not just specialist resources but at all levels and grades across the company) but it also has broader implications for IAA ANSP. To illustrate the point, we are required "*to ensure that [we] can provide ATM services in a safe, efficient, continuous and sustainable manner, consistent with any foreseen level of overall demand for a given airspace. To this end, [we] shall maintain adequate technical and operational capacity and expertise*".

7.30 Regulation (EU) 2017/373 requires service providers to implement and maintain a management system that includes a process to ensure that the personnel of the service provider are trained and competent to perform their duties in a safe, efficient, continuous and sustainable manner. Satisfying this requirement has necessitated the deployment of 2 ATCOs to develop and maintain an ANSP-wide training programme with training material specifically tailored for most roles within the ANSP. This training will be delivered on a phased basis commencing with identified personnel who are deemed integral to safety management. Further training, broader in scope based on the competences required for each role, will be developed and delivered to effectively all staff within the ANSP. This training material will be subject to SRD approval.

Recommended 10% Buffer

7.31 The Network Manager continues to recommend that European ANSPs plan for an additional 10% capacity buffer due to the uncertainties surrounding forecasting at this unprecedented time. This misaligns somewhat with the most recent recommendations from the PRB with regard to the relevant traffic forecasts (Scenario 2) for RP3 upon which this Plan is based.

Annual Leave & Overtime

7.32 A certain level of overtime is inevitable as Operations crews to workload [explained below] and overtime is used to cover for unplanned staff shortages due to sickness etc., otherwise service provision would be liable to short notice interruptions. Annual leave is granted when available staffing levels are above the minimum required to safely provide our services. The IAA SP does not maintain a "buffer" on the roster as this would be an extremely inefficient use of resources and would directly lead to further annual leave accumulation and additional costs.

"buffer" on the roster as this would be an extremely inefficient use of resources and would directly lead to further annual leave accumulation and additional costs.

7.33 The provision of annual leave is a legal requirement and management are determined to reduce overall accumulation levels. ATCO overtime was averaging at 4% of ATCO salaries in the months of January & February 2020. While, as expected, there was a huge reduction in overtime levels from March onwards with some months of zero overtime recorded, the overtime total for the final ten months of 2020 averaged at 0.95 % of ATCO salaries and resulted in an annual total of 1.45%. This compares to 6.35% in 2018 and 4.2% in 2019.

7.34 During RP2 unprecedented traffic levels, significantly greater than those forecasted during the preparation of the RP2 business plan, were handled by IAA ATCOs with no en-route capacity delays. This was however achieved by prioritising service delivery over the delivery of CAPEX and other projects and a range of short-term staff management solutions including overtime and leave-deferral.

7.35 The following graphs clearly show the upward trends in overtime and annual leave accumulation which only reduced when staffing levels increased towards the end of RP2. Overtime costs had reached 6.35% of ATCO payroll costs in 2018 following a number of years of steady growth. The increased ATCO numbers in 2019 saw this percentage reduce to 4.2% in 2019.

Figure 20 ATCOs and ENR & Commercial TER Traffic

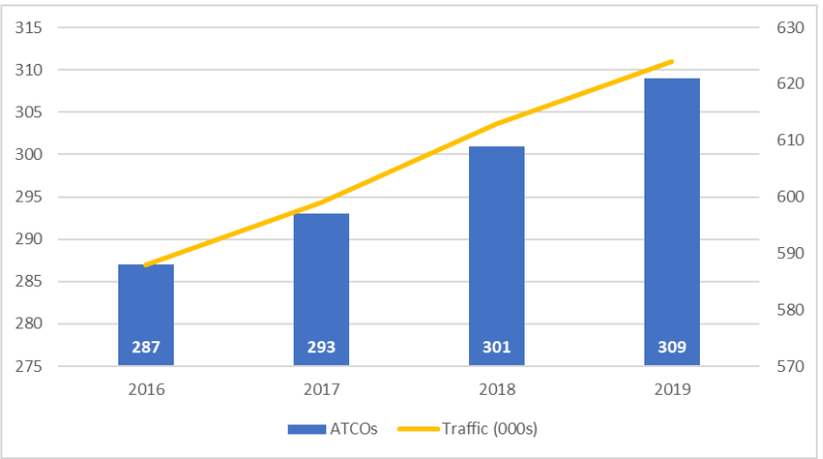
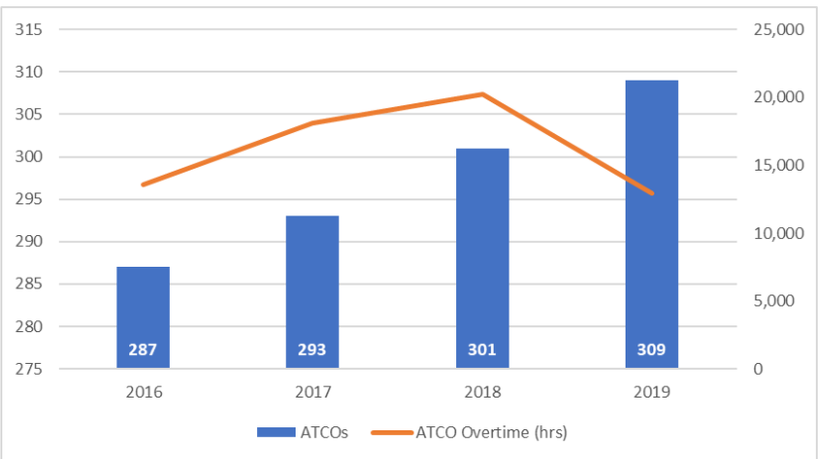


Figure 21 ATCOs vs Overtime



7.36 If the planned ATCO numbers are not achieved during RP3, it is inevitable that we will see a reverse of the downward trends achieved in 2019 and a return to increasing trends in the use of

overtime and annual leave deferral. A heavy reliance on overtime and annual leave deferral is not a sustainable long-term solution, in terms of cost and in terms of fatigue management. The link between fatigue and the excessive use of overtime and the annual leave deferral must be emphasised.

7.37 Fatigue is a key safety consideration when rostering ATCOs. Regulation (EU) 2017/373 lays down explicit requirements for the management, prevention and analysis of fatigue, in accordance with certain legal and operational requirements. The duty and rest periods which form ATCO rosters have been subject to a fatigue risk assessment which was verified through the FAID fatigue bio-mathematical model and are deemed compliant with the fatigue requirements of this regulation. In addition, our ATCO rosters must remain compliant with the Organisation of Working Time Act 1997, including but not limited to duty start times, minimum time between duties and working week hourly limits.

7.38 The airline industry in both Europe and the United States, has previously encountered difficulties with rostering which resulted in large scale flight cancellations, significant cost to airlines and disruption to the travelling public. As the industry recovers from the COVID-19 downturn, a lack of sufficient ATC capacity to meet demand as a result of a shortage of appropriately trained ATCOs must be avoided.

7.39 ✂

7.40 ✂

7.41 ✂

7.42 ✂

7.43 ✂

7.44 ✂

7.45 We need to ensure that we reach our planned 2024 ATCO staffing levels in order to have the capacity to train sufficient numbers of student controllers during RP4. If the IAA ANSP fails to reach our planned 2024 ATCO numbers and we end up carrying a deficit of ATCOs into RP4, then we will not have the capacity to rectify this deficit while coping with retirements and at the same time facilitating an increase in ATCO numbers as required to deliver ATM/ANS services in line with potential traffic increases over the course of RP4. If this is the case, then it may well be into the early years of the next decade before this situation could be satisfactorily addressed.

Rostering

7.46 The IAA ANSP utilises a “crew to workload” principle whereby duty start times are staggered to provide for increased ATCO numbers during busier periods with reduced staffing in quieter times. This rostering principle maximises the efficient use of available resources.

7.47 The efficient use of ATCO resources is further enhanced as most en-route ATCOs are not sector specific licensed. As explained above, ATCO multi-authorisations, whereby ATCOs are typically authorised to operate a number of unit-endorsements afford the ANSP great flexibility and efficiencies in staffing. IAA ATCOs are effectively system trained with a unit endorsement and are

therefore not limited to specific geographically defined sectors thereby providing maximum flexibility and efficiency to the ANSP.

7.48 Additionally, the IAA ANSP uses dynamic sectorisation rather than a fixed sector plan. Sectors are opened, combined and closed dynamically in response to traffic loadings, thereby closely matching capacity with demand. These concepts are recommended for use across Europe in the 2019 Airspace Architecture Study and the Wise Persons Group reports. Further efficiency is provided by the use of Single Person Operations[27] in en-route operations during periods of relatively low traffic and low complexity. These efficiencies are not the norm in a European context. By ensuring the continued provision of these efficiencies through the implementation of this business plan, the IAA ANSP contribution to the pan-European capacity and cost efficiency targets is ensured.

Safety/Regulatory Compliance

7.49 Commission Implementing Regulation (EU) 2017/373 is a comprehensive wide-ranging regulation which lays down common requirements for providers of Air Traffic Management (ATM), Air Navigation Services (ANS) and other air traffic management network functions and their oversight. It repealed Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amended Regulation (EU) No 677/2011. The Regulation entered into force on March 1st, 2017 and applied from January 2nd, 2020.

7.50 As defined under Regulation (EU) 2017/373, the IAA Service Provider provides ATM and ANS services. Key focus areas of the Regulation for the Service Provider are compliance monitoring; quality management; the management, assessment and oversight of changes, ATSEP (Air Traffic Safety Electronics Personnel) training and competence and more general training and competence across the entire service provider. ✂

7.51 The Regulation contains 13 Annexes which include:

- Annex II - Requirements for competent authority oversight of services
- Annex III & Annex IV - Requirements for service providers
- Annex V - Requirements for aeronautical information services
- Annex XIII - Requirements for ATSEP [Air Traffic Services Electronics Personnel] training and competence assessment

7.52 Regulation (EU) 2017/373 has already been subject to a limited number of amendments by Regulation (EU) 2020/469[28] which will apply from 2022.

7.53 The regulatory and administrative burden of developing, implementing and maintaining the required safety, quality and management processes and procedures to ensure compliance with this and other similar such regulations [e.g. Regulation (EU) 2015/340] and standards [ISO

[27] En-route sectors are typically 2 person operations due to the workload involved. Shannon ENR uses Single Person Operations [SPO] during periods of low traffic levels and complexity.

[28] Commission Implementing Regulation (EU) 2020/469 of 14 February 2020 amending Regulation (EU) No 923/2012, Regulation (EU) No 139/2014 and Regulation (EU) 2017/373 as regards requirements for air traffic management/air navigation services, design of airspace structures and data quality, runway safety and repealing Regulation (EC) No 73/2010

9001:2015] is sizeable. Traditionally the IAA has been very "lean" in these areas and we are having to increase resources to ensure compliance with regulatory requirements, NSAI standards and industry best practice across the entire service provider.

7.54 Safety-related activities such as change management (complex and non-complex changes), safety case production, non-conformity tracking and closure, HazID attendance, auditing and operational staff training have all necessitated the deployment of increased resources, with more specialised training for all the staff involved. Certain aspects of this safety training have yet to be developed and a requirement for re-occurrent training for the personnel involved in all aspects of safety-related work has also been identified.

7.55 The delivery of recent projects such as the new Dublin Tower and the new Contingency ENR Centre at Ballygirreen, each project within excess of 20 Safety Cases (with multiple versions and reviews), combined with the general ongoing safety and compliance work have highlighted the increased workload and time requirements. The safety performance of the IAA SP continues to be outstanding and this remains a key priority area for the IAA SP. We have achieved our RP2 safety targets and our EUROCONTROL/CANSO SMS Standard of Excellence (SoE) and EASA Effectiveness of Safety Management (EoSM) performance continues to reflect our commitment in this area. More detailed analysis of the safety performance of the IAA SP is provided in paragraph 6.5.

7.56 Our existing Unit Safety Managers, Compliance Manager and ATM Standards & Procedures domain need further resources to support their activities and a requirement for 3 ATCOs, who will draw upon their ATM/ANS experience and knowledge in the preparation and analysis of safety material and will assist existing safety staff has been identified. In addition, the appointment of fulltime Quality Manager and 3 support staff is required as the entire service provider moves from a business management system and establishes an integrated management system as recommended by Regulation (EU) 2017/373[29].

7.57 Further resource support and technical solutions may also be necessary as the volume of paperwork and administration has increased and the standards required of quality, compliance, and consistency across the entire service provider has needed improvement. The IAA SP is determined to address any deficiencies identified in these areas. Indeed, the SRD has demanded such improvements. However, such necessary improvements will not occur without adequate resourcing.

COOPANS

7.58 The IAA ANSP, as part of the COOPANS ATM system strategic partnership, intends to apply for SESAR funding to partly offset the cost of the modernisation of the ATM platform to support improved safety and capacity performance while facilitating the aims of the Airspace Architecture Study such as virtual centres, remote sector operations and the operation of an ADSP. While the exact numbers of staff involved has yet to be determined, it is expected that the development of this ATM platform in conjunction with our ANSP partners and a system supplier will require the full time participation of at least 2 ATCOs between 2022 and 2027.

Parents Statutory Leave Entitlements

[29] EASA Easy Access Rules for ATM/ANS Regulation (EU) 2017/373: Annex III ATM/ANS.OR.B.005 Management System

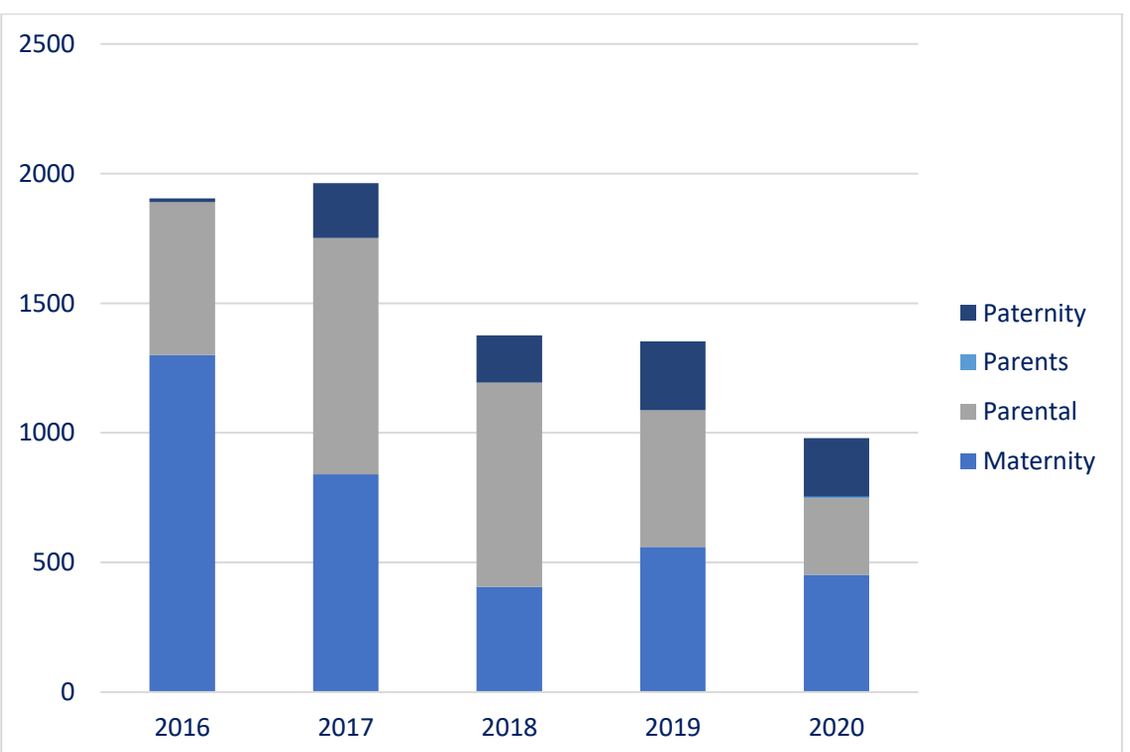
7.59 Another source of demand for ATCO resources comes from Parents Statutory Leave Entitlements. A focus by Irish Governments over recent years on statutory leave entitlements has resulted in greatly increased employee entitlements in this area. In an essential service such as ATM/ANS provision, this requires additional resources to provide cover for employees availing of such entitlements.

Table 13 Parents Statutory Leave Entitlements

Type	Duration
Maternity leave	26 weeks and up to 16 unpaid weeks
Paternity leave	2 weeks
Parental leave	26 weeks
Parent's leave	Increased to 5 weeks from April 2021)

7.60 The cumulative effects of these entitlements in recent years on the IAA SP has been significant, with over ✂ days of leave availed of by ATCOs during RP2. This is the equivalent of approx. ✂ FTEs per annum. This number is likely to further increase over RP3 due to the age and gender profile of our ATCO staff. In the most recent budget, the Irish Government made provision for further changes (increases) to these entitlements and has recently confirmed that these changes will be effective from April 2021. The Irish Government also indicated that further increases are under consideration and consequentially, the figure of ✂ FTEs per annum will likely be exceeded by the end of RP3.

Figure 22 Statutory Leave Totals



Note: Maternity leave totals include paid and unpaid maternity leave.

Summary of ATCO requirements

7.61 Despite the downturn in 2020 and 2021, it follows that there will be implications for the delivery of operationally and environmentally efficient ATM services in Irish controlled airspace and at the three State airports if the required number of Air Traffic Controllers is not included in the revised RP3 Performance Plan that is submitted to the European Commission.

7.62 Given that IAA ANSP will not compromise on safety under any circumstances, any shortfall in ATCO numbers below those levels planned for RP3 would introduce significant risk to the quality of ATM/ANS services that our airline customers expect.

7.63 ✂

7.64 A shortfall in the number of staff required at Dublin will restrict our capacity requirements to operate parallel runway operations from 2023. The capacity and environmental effects of this are explained in Section 6.6.

Table 14 Operational Management and Support requirements for RP3

	2019 A	2020 A	2021 F	2022 F	2023 F	2024 F
Ops Mgmt. & Support	60	60	64	68	69	69

7.65 Operations support staff support the ANSP through management of its operations, safety management and improvement, airspace design and ATCO training. An increase of 9.5 headcount in this area is required over the RP3 period as follows:

Staffing	Numbers Required	Rationale
Compliance manager	1	EU Regulation 373/2017 requires that the ANSP establish a compliance monitoring function to monitor compliance with regulatory requirements
Compliance/Quality Support	4	Support staff required for Compliance and Quality functions as the ANSP moves from a business management system and establishes an integrated management system as recommended by Regulation (EU) 2017/373
Unit Safety Supports	2	Dedicated full-time SMS safety experts are required at unit SMS level to strengthen unit safety management functions and alleviate the increased workload associated with ongoing regulatory and process changes to SMS/SRM core activities and the roll out of operational and technical projects.
Unit Management Safety Support Technology	1	Technical services are subject to an increasing number and scope of changes to the functional system which are in turn subject to more detailed change management and safety risk

		assessment processes as prescribed by Regulation (EU) 2017/373. The increased workload associated with these activities and the technical nature of the content necessitates support for the Technical services Unit Safety Manager
Environmental Monitoring Analysts	1.5	Operations, Technology and Corporate functions all require increased monitoring, reporting and strategic input regarding environmental matters on both a national and European level. Given the interaction between environment and capacity these roles would also input to monitoring of capacity management and planning.

Data Assistants

7.66 ✂

Table 15 Data Assistant requirement over RP3

2019	2020	2021	2022	2023	2024
39	39	38	38	38	38

Corporate Services

7.67 Corporate Services staff cover human resources, procurement, ICT, finance, legal, property, security, communications etc. Corporate services headcount is expected to remain relatively constant during RP3 with some retirements from existing positions expected to be filled. This is notwithstanding the continued increase in regulatory burden (volume of material required by CAR, PRB and EC), further requirements for contingency and business continuity planning and analysis, the designation of the IAA ANS services as a critical network service and other general governance and compliance requirements on the IAA ANSO (e.g. sustainability, climate change, diversity, reporting requirements etc).

Table 16 Corporate Services Requirement

	2019 A	2020 A	2021 F	2022 F	2023 F	2024 F
Corporate Services	68	66	65	57*	57	57

7.68 Post separation the staff currently employed by the IAA to provide essential services relating to the HQ building (security, reception) will remain with the regulator and be re-charged to the ANSP as part of other operating costs. These staff have been removed from headcount and staff cost figures from 2022 onwards.

7.69 There is a 11% charge of corporate services headcount to SRD. Within Corporate Services, with the exception of 1 in finance (person to retire, SRD expected to replace the position), there are no other roles that are/were specifically related SRD activities. The majority of corporate services roles relate to the management and running of a corporate entity, noting the range of legal, financial, governance, reporting, HR, procurement and regulatory obligations on any company as

well services required to ensure that the IAA can deliver its statutory functions (e.g. HR services, property, security, facilities, payroll, ICT etc).

7.70 The Plan does include headcount that will transfer to SRD with the IAA's HQ property, with the new Regulatory Authority taking up the management of the IAA's HQ building post restructuring – explaining a lower headcount. This equates to 6 or c.11% but it is important to note that there will be a cross charge for these services to the ANSP, which implies there will not be a material change to the ANSP costs even though the headcount reduces. As set out in para 7.6, a portion of the corporate services headcount presented is required for unregulated activity (also 11%) and this is reflected in the required costs (i.e. is not included in the costs).

7.71 Furthermore, while there is a loss in economies of scope, the corporate services workload will be reduced for SRD but will be replaced to a large extent by additional work streams including increased regulatory commitments. In addition, as the restructuring process requires that the IAA's ANS services will be carried out by a legally separate company (AirNav Ireland) from the IAA post restructuring, there will be no loss in corporate activity (i.e. all of the legal, governance, financial etc activities required to service a corporate entity will remain).

7.72 ✂

7.73 ✂. The recent HSE and Department of Health cyberattacks (and Irish ISP DDOS attacks), have brought the cyber threats to the fore (e.g. estimated cost of the HSE cyberattack @€100million), and this has increased focus on cybersecurity within the IAA. ✂.

7.3 Pension Costs

7.74 The IAA has four pension schemes. For employees who joined the IAA prior to 1 April 2008 and for employees who joined between 1 April 2008 and 31 December 2011, the IAA operates a defined benefit contribution scheme. This scheme is subject to an actuarial valuation every three years. The latest valuation was on 1 January 2018. The pension valuation at 1 January 2021 is currently underway but the final outcome is not yet known. If the outcome of the valuation is different to the assumptions included in this Plan, the Plan will be updated accordingly between now and the end of July. The scheme is also subject to The Pensions Authority's minimum funding standard (MFS). At the latest valuation, the pension scheme's actuary has calculated that the required level of contributions required to meet both the ongoing valuation and the MFS is in the order of 42% of pensionable pay. This Plan assumes that the employees of the ANSP will continue to make a pension contribution of 6% per annum thereby resulting in a pension contribution of 36% per annum by the employer. ✂. Depending on the outcome of the pension-related deliberations, this charge may need to be updated.

Table 17 Pension Cost Requirements for RP3[30]

2017 prices	2019 €'000	2020 €'000	2021 €'000	2022 €'000	2023 €'000	2024 €'000	RP3 €'000
En route	11,517	11,238	11,103	11,887	12,145	12,414	58,786
Terminal	1,949	1,883	1,838	2,001	2,036	2,071	9,829
Total	**13,466**	**13,121**	**12,941**	**13,889**	**14,180**	**14,484**	**68,615**

7.75 For employees who joined the company from 1 January 2011 to date, the IAA operates a hybrid pension scheme i.e. a defined benefit scheme up to a cap and a defined contribution scheme thereafter. The triennial valuation as at 1 January 2021 is underway and the Plan will be updated for the outcome of this valuation.

7.76 For employees who exceed the hybrid defined benefit cap there is a defined contribution scheme. The IAA matches any employee contributions up to a maximum of 7%.

7.4 Technical Services Requirement 2020-2024

7.77 An increase in Engineers from 72 to 94 over the RP3 period is required to support current operational systems and deliver future systems into operation. In particular, increased engineering resources are required to support the new control tower at Dublin airport in terms of power supply, telecoms, air conditioning, CNS and ATM systems. The current tower will be maintained as a contingency tower requiring ongoing monitoring and maintenance. The new parallel runway will have new instrument landing systems and new ground radar systems which will also require engineering resources to monitor and maintain.

Table 18 Technical Services Requirement over RP3

	2019 A	2020 A	2021 F	2022 F	2023 F	2024 F
Engineers	72	73	84	90	93	94

7.78 This Plan assumes that total capital expenditure in RP3 (cashflow basis) will amount to €103.17 million. The IAA is committed to delivering its planned CAPEX programme and the forecasted engineering headcount for RP3 will ensure that this programme is delivered.

7.79 The additional engineering headcount also makes provision for the planned implementation of various regulations including EU Regulation 373/2017 and the NIS directive. Implementation will require new engineering skills, increased competency and training and an enhanced security capability.

7.80 Our new en route contingency centre, located at Ballygirreen, is operational since December 2020. This is a significant operational facility requiring additional engineering resources for monitoring and maintenance of power supplies, telecoms, air conditioning, CNS and ATM systems. This centre will improve our systems and operations resilience.

[30] Pension costs may need to be updated for the outcome of ongoing discussions on the Separation Project

7.81 Finally, a higher engineering headcount is justified from the viewpoint of ongoing maintenance of operational systems. Older CNS systems had longer lifecycles whereas the modern systems are server-based requiring more software patching and updates. With regulatory demands in terms of QMS, SMS, SeMS etc for quality, safety and security, there is a requirement for additional headcount.

7.5 Other Operating Costs

7.82 Other operating costs comprise training, systems and equipment maintenance, spares, telecommunications and administration costs including rent and rates, insurance, security, building repairs and maintenance, cleaning etc. These costs can be broken down between en route and terminal as follows:

Table 19 Required Other Operating Costs in RP3 (En Route and Terminal)

2017 prices	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
En Route	23,990	21,696	27,899	34,336	35,395	34,469	153,795
Terminal	7,705	4,754	6,389	7,879	8,151	7,909	35,081
Total	**31,695**	**26,450**	**34,287**	**42,215**	**43,545**	**42,379**	**188,876**

7.83 Included in these totals are €4.3 million for en route and €0.8 million for terminal relating to the costs to be incurred by the ANSP from the proposed restructuring of the IAA. The breakdown of these costs is set out in paragraph 7.128. Other operating costs are broken down as follows:

Table 20 Breakdown of Other Operating Costs required in RP3

En Route/Terminal *2017 prices*	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
Travel	1,284	401	782	1,113	1,266	1,365	4,926
✂	✂	✂	✂	✂	✂	✂	✂
Utilities	480	470	621	635	635	635	2,996
✂	✂	✂	✂	✂	✂	✂	✂
Other Operational	6,232	6,264	7,725	9,329	9,717	9,766	42,802
Subscriptions	453	249	389	383	376	370	1,768
Administration	14,086	11,522	15,774	18,914	19,070	19,472	84,751
Total	**31,695**	**26,450**	**34,287**	**42,215**	**43,545**	**42,379**	**188,876**

Travel

7.84 Travel costs incurred in 2020 were exceptionally low and there was less than a month 'normal activity'. Travel costs are expected to recover to 2019 levels by 2024. All travel and subsistence costs are paid at rates approved by the Department of Finance. This Plan makes provision for costs

of travel associated with domestic travel by IAA employees to IAA offices and facilities and for costs of international travel.

Table 21 Required Travel Costs in RP3 (En Route and Terminal)

2017 prices	2019 A €'000	2020 A €'000	2021 F €'000	2022 F €'000	2023 F €'000	2024 F €'000	RP3 €'000
En route	1,101	349	656	934	1,063	1,146	4,148
Terminal	183	51	125	179	203	219	777
Total	**1,284**	**401**	**782**	**1,113**	**1,266**	**1,365**	**4,926**

Training

7.85 Commission Regulation (EU) 2015/340 lays down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates**.** This Regulation applies to student air traffic controllers, air traffic controllers, persons and organisations involved in the licensing, training, testing, medical examination and assessment of applicants.

7.86 Commission Regulation (EU) 2017/373 lays down specific requirements covering ATSEP [Air Traffic Safety Electronics Personnel] training related to 'any authorised personnel who are competent to operate, maintain, release from, and return into operations equipment of the functional system'.

7.87 Ensuring compliance with these regulations has necessitated increased resources to conduct the following training-related activities:

a) training development,

b) training regulatory approval process,

c) training delivery,

d) training attendance and,

e) unit competence scheme.

7.88 Our RP3 training plans includes:

a) ATSEP training [pursuant to Regulation 2017/373]
b) ATCO Initial, Unit, Continuation and Practical/Assessor training [pursuant to Regulation (EU) 340/2015].
c) General training.

7.89 Continuation training is mandatory training designed to maintain the validity of endorsements of ATCO licences and consists of refresher training and conversion training.

7.90 Refresher training is training specifically designed to review, reinforce or upgrade existing knowledge and skills of ATCOs and is required to contain training in standard practice and procedures, training in abnormal and emergency situations and human factors training [i.e. stress management, fatigue management and team resource management]. The SP is required to provide annual refresher training for each unit endorsement. Refresher training is also provided

at least once every three years for all other positions such as Station Manager, Coordinator, Flight Data Control etc. Such training has added importance in 2021 and 2022 to maintain the skills and knowledge of ATCOs as traffic and complexity levels return to normal after a prolonged depressed period.

7.91 Conversion training provides knowledge and skills appropriate to a change in the ATCO operational environment and covers all training associated with COOPANS Builds [U002; R001; S001; Q001], Remote Tower operations, new Voice Communications System training [S005], replacement Emergency Air Situational Display System [U003] and the introduction of Time-Based Separation at Dublin.

7.92 Our RP3 training programme is required to ensure that:

a) The IAA will have sufficient numbers of trained, competent and licenced ATCOs and Engineers, to provide "services in a safe, efficient, continuous and sustainable manner, consistent with any foreseen level of overall demand for a given airspace" as required under Regulation (EU) 2017/373. Failure to appropriately train sufficient staff will directly impact on the ability of our Engineers and ATCOs to perform their key functions required for the provision of an ATM/ANS service. This would inevitably have a direct impact on capacity which would have to be reduced to maintain the required safety margins in the operation.

b) The IAA can meet its RP3 environmental, capacity and safety performance targets by training ATCOs in new procedures required to facilitate developments such as Parallel Runway operations, Low Level airspace reorganisation, cross border Free Route Airspace, successive COOPANS Builds, Voice Communications and Control Systems (VCCS) replacement, etc.

c) The IAA can meet its ambitious RP3 capacity and environmental targets by ensuring sufficient numbers of ATCOs are available so as to minimise the implementation of ATFM delays in our en-route and terminal services and limit rerouting restrictions.

7.93 The IAA has sufficient, appropriately trained staff to safely operate all system upgrades included in our RP3 CAPEX plan.

7.94 General training covering computer skills training, health and safety, management, security and succession training.

Table 22 Required Training Costs in RP3 (En Route and Terminal)

2017 prices	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
En route	✂	✂	✂	✂	✂	✂	✂
Terminal	✂	✂	✂	✂	✂	✂	✂
Total	✂	✂	✂	✂	✂	✂	✂

7.95 ✂

Table 23 ATCO Training Costs in RP3

✂

Table 24 Planned ATCO Training recommencing in 2022

✂

7.96 ✂

7.97 ✂

7.98 The cost of training for engineers is expected to increase in RP3 due to several factors as follows:

- Increased engineering headcount of circa 30% per annum over RP3
- Requirements associated with EU Regulation 373/2017
- Network and Information Security directive and the IAA's new Security Management System (SMS)
- The significant increase in capital expenditure e.g. EASDS[31], ATM systems, radar replacement

Table 25 Engineering Training Costs

✂

7.99 IAA ANSP provides training to support succession management and employee wellbeing including supporting requirements under Regulation (EU) 2017/373 as it applies to fatigue risk management. The below category 'Other Training' also includes general training covering computer skills training, health and safety, management, security and succession training.

Table 26 Required Other Training Costs in RP3

✂

Utilities

7.100 Utilities comprise costs of telephones and light and heat. Utilities account for approximately 0.5% of total expenditure.

Table 27 Required Utilities Costs in RP3 (En Route and Terminal)

2017 prices	**2019 A €'000**	**2020 A €'000**	**2021 F €'000**	**2022 F €'000**	**2023 F €'000**	**2024 F €'000**	**RP3 €'000**
En route	408	365	476	488	488	488	2,304
Terminal	72	105	145	147	147	147	692
Total	**480**	**470**	**621**	**635**	**635**	**635**	**2,996**

[31] The Board approved the business case for the EASDS replacement, at its meeting in June ·
A technical specification is currently being prepared for a tender issue in the coming weeks. It is a requirement to support continued service provision, business continuity and resilience.

Telecommunications

7.101 This subcategory accounts for the costs of private wires for the transmission of radar data, flight plans, meteorological information and voice communications. The costs of these lines are planned to increase in RP3 due to the new tower at Dublin airport and the new en route contingency centre, which requires a parallel network. Along with this, there is an increased cost associated with the transition from TDM to IP Technology.

Table 28 Required Telecoms Costs in RP3 (En Route and Terminal)

✂

7.102 TDM private wires are required for the stability they provide, and the newer IP services need to be monitored over time before they can be used to replace legacy TDM. Few, if any, European ANSP's are using IP networks for air-ground voice in a live operation environment. The IAA will operate with both for a period of time until IP network technology is fully proven for mission critical services. These costs are continually kept under review and, where possible, legacy lines are discontinued.

Other Operational costs

Table 29 Required Other Operational Costs (En Route and Terminal)

2017 prices	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
En route	5,016	4,956	6,045	7,332	7,645	7,682	33,659
Terminal	1,216	1,309	1,681	1,998	2,072	2,084	9,143
Total	**6,232**	**6,264**	**7,725**	**9,329**	**9,717**	**9,766**	**42,802**

7.103 Other operational costs include the costs of maintenance, spares, power, flight checking and other. This Plan makes provision for these costs in RP3 as follows:

Table 30 Breakdown of Required Other Operational Costs

En Route/Terminal / *2017 prices*	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
Maintenance	4,185	4,048	5,017	5,837	6,220	6,268	27,390
Spares	779	879	1,093	1,378	1,378	1,378	6,105
Power	833	914	1,162	1,340	1,340	1,340	6,097
Other	435	423	453	774	778	779	3,208
Total	**6,232**	**6,264**	**7,725**	**9,329**	**9,717**	**9,766**	**42,801**

Maintenance

7.104 ✂

Spares

7.105 The increase in the cost of spares reflects the increased capital spend with some large projects coming into operation during RP3 e.g. the new contingency centre and new tower.

Other

7.106 ✂

Subscriptions

Table 31 Required Subscriptions Costs (En Route and Terminal)

2017 prices	**2019 A €'000**	**2020 A €'000**	**2021 F €'000**	**2022 F €'000**	**2023 F €'000**	**2024 F €'000**	**RP3 €'000**
En route	372	209	322	317	312	306	1,467
Terminal	80	40	67	66	65	63	301
Total	**453**	**249**	**389**	**383**	**376**	**370**	**1,768**

7.107 Subscription costs include the costs of the IAA's participation in the COOPANS Management Office and SESAR 2020 as well as the Borealis Strategic Alliance.

Administration costs

Table 32 Required Administration Costs (En Route and Terminal)

2017 prices	**2019 €'000**	**2020 €'000**	**2021 €'000**	**2022 €'000**	**2023 €'000**	**2024 €'000**	**RP3 €'000**
En route	9,519	9,547	12,949	15,525	15,644	15,997	69,662
Terminal	4,567	1,975	2,824	3,389	3,426	3,475	15,089
Total	**14,086**	**11,521**	**15,773**	**18,913**	**19,071**	**19,472**	**84,751**

7.108 Administration costs include rent and rates, computing, insurance, buildings repairs and maintenance, security, cleaning, consultancy, audit, pension and legal fees, recruitment, medicals, employee wellbeing and health and safety, stationery and file storage. The significant items have been broken out as follows:

Table 33 **Breakdown of Required Administration Costs**

En Route/Terminal *2017 prices*	**2019** **€'000**	**2020** **€'000**	**2021** **€'000**	**2022** **€'000**	**2023** **€'000**	**2024** **€'000**	**RP 3** **€'000**
Rent and rates	2,574	2,734	2,921	2,947	2,997	2,997	14,595
Computing	1,660	1,612	2,319	2,907	3,028	3,266	13,131
NIS	0	0	0	190	280	274	744
Consultancy	1,013	414	1,118	1,626	1,545	1,625	6,328
✂	✂	✂	✂	✂	✂	✂	✂
Building repairs	949	809	1,594	1,399	1,455	1,400	6,658
Environmental	0	0	161	332	332	332	1,157
✂	✂	✂	✂	✂	✂	✂	✂
Professional services	538	520	527	799	799	799	3,445
✂	✂	✂	✂	✂	✂	✂	✂
IAA restructuring	0	339	693	0	0	0	1,033
Impairment	0	873	0	0	0	0	873
PR	355	83	350	1,063	819	899	3,214
Staff related	523	437	761	1,068	1,068	1,068	4,401
Other	3,794	297	1,290	2,253	2,355	2,360	8,554
Total	**14,086**	**11,521**	**15,773**	**18,913**	**19,071**	**19,472**	**84,751**

* Full description outlined at paragraph 7.132

Rent and rates

7.109 The IAA rents several of its operational sites including its buildings at Dublin and Shannon airports as well as remote sites housing radars and other equipment. The ANSP's share of rent for its corporate headquarters is also included here. ✂.

Computing

7.110 Computing costs comprise costs of computer hardware and software maintenance, agency costs of frontline ICT staff, ICT security and disaster recovery costs, costs of back-up and storage of data and costs of consumables. The increase in computing costs from 2020 reflects the increasing price pressure on existing hardware and software maintenance contracts, new contracts as new technologies are implemented and the increasing trend away from on-premise solutions towards software as a service.

NIS – Network and Information Security

7.111 The IAA is required to be compliant with the EU Directive on security of network and information systems (NIS Directive) from January 2020. This Directive mandates that the IAA has the capability to 'identify, protect, detect, respond and recover' regarding security issues. Therefore, as part of

ensuring compliance with this Directive, the IAA needs to invest in its cyber defences to meet the increased risk profile caused by cyberthreats. These threats are becoming increasingly prevalent and sophisticated. This will also enable the IAA leverage digital technologies to share information more effectively.

7.112 The following projects are driving increased OPEX requirements over RP3 period from 2022

7.113 ✂

7.114 ✂

Regulatory Framework

7.115 Both ICT and ATM/ANS are striving to meet the NIS standard and IAA ANSP's CAP activities will require costs to ensure IAA ANSP can meet this requirement. In addition, new EASA regulation in development will mandate a requirement for engineers in operations to maintain an Information Security Management System which has a further cost requirement.

Independent Oversight

7.116 There are multiple independent audits and reviews that lend to the oversight of the ICT services – IAA ANSP has identified a need to increase the frequency and volume of audits which will incur an increase in Opex.

Consultancy

7.117 The IAA typically engages external consultancies when specialised expertise is required. This could be in the fields of safety management, flight procedures, technology resilience, pay and pensions. This business plan assumes a relatively small increase over the course of RP3.

Insurance

7.118 ✂

Building repairs

7.119 The operational buildings occupied by the IAA are in increasing need of repair, maintenance and upgrade as well as the life-cycle renewal of building plant and equipment. Our main centre at Ballycasey is now 18 years old while at Dublin and Shannon airports the buildings are about 25 years old. The IAA has 27 remote operational sites around the country of varying ages which require a complete review in terms of structural integrity and regulatory compliance e.g. fire safety and health and safety obligations to ensure that they remain fit for purpose and meet our operational requirements. It is known that the cost of buildings repairs will be higher in RP3 compared to RP2 due to the ageing property portfolio. ✂

Security

7.120 ✂

Other Administration Costs

7.121 Post separation the staff currently employed by the IAA to provide essential services relating to the HQ building administration costs will remain with the regulator and be re-charged to the ANSP, these costs are included as part of administration costs.

Professional services

7.122 Professional services comprise the costs of audit and audit-related fees, taxation, pension administration, pension actuarial and advisory and legal fees. This business plan assumes a modest increase in charges in RP3 to reflect the fact that some of these services will be subject to tender in the coming months.

Staff related

7.123 Staff relates costs comprise of medicals, employee wellbeing, health and safety and recruitment costs. As noted previously, the business plan allows for the recruitment of SCP and associated recruitment costs are included here.

Cleaning

7.124 ✂

Environmental

7.125 Following the Irish Government's May 2019 announcement of a Climate and Biodiversity emergency, semi-states and public sector bodies will be required to take the lead in reducing carbon emissions and becoming more energy efficient. The IAA plans to implement a carbon emissions reduction strategy with the objective of reducing and offsetting our carbon footprint using the cut-convert-compensate model. The IAA will undertake highly focused energy efficiency projects on an annual basis to reduce the company's energy consumption supported by a structured environmental and energy management system to ensure that continual focus on CO2 reduction is achieved. We will transition to low carbon technologies and harness renewable energy sources while substituting remaining fossil fuel-derived energy sources for carbon-neutral energy sources. Sustainability and environmental prioritisation has been emphasised by the Government to the IAA as issue which should be prioritised in the coming years and this plan reflects the priority that Government places on this area.

Impairment

7.126 During 2020, impairment costs were incurred due to the discontinuation of a capital project, due to changes in Regulations since the project was conceived and savings to be generated from pursuing alternative options.

Public Relations

7.127 PR costs comprise of CSR activities, educational initiatives, crisis management costs, communication contract, annual report, attendance and support at events such as the World ATC. ✂

Unavoidable costs associated with new ANSP structures

7.128 It is Government policy that the IAA's air traffic control activities should be separated from the IAA's functionally separate safety regulation activities. This will result in additional costs to be borne by the ANSP in the areas of staff costs and operating costs. The table below sets out the additional operating costs that have been included in this Business Plan.

7.129 Operating costs as a result of the separation initiative and establishment of the new ANSP are broken down as follows:

En Route/Terminal	**2020**	**2021**	**2022**	**2023**	**2024**	**RP3 €'000**
2017 prices	**€'000**	**€'000**	**€'000**	**€'000**	**€'000**	
Rent and rates			101	101	101	303
Computing			348	348	348	1,044
Building repairs			33	33	33	99
Consultancy	339	693	94	94	94	1,315
Professional services			88	88	88	263
Staff-related			114	114	114	343
Cleaning			93	92	92	278
Other			474	474	474	1,422
Total	**339**	**693**	**1,346**	**1,344**	**1,344**	**5,067**

7.130 The impact of the restructuring on the ANSP's cost base is driven by the following factors:

1) ✂

2) ✂

3) The indirect costs/corporate costs of the IAA e.g. audit fees, pension administration, staff-related costs, communications etc previously shared with the Regulator will now be borne 100% by the ANSP (see below for financial impact).

4) The plan includes ✂ in capital expenditure in relation to expected ICT costs on separation.

5) The costs included for 2020 and 2021 relate to the professional fees to assist in the restructure

7.131 These costs of restructuring have been included in the IAA's total en route and terminal cost base but, for clarity, the financial impact has been separately reported below.

7.132 The financial impact on both the en route and terminal cost base is estimated as follows:

Table 34 Restructuring Impact on En Route Costs

En Route	Ref	2020	2021	2022	2023	2024	Total
		€'000	€'000	€'000	€'000	€'000	€'000
Staff costs	1	-	523	1,089	1,108	1,122	3,843
Other operating	2	289	595	1,129	1,128	1,128	4,270
ICT Capex	3	0	0	588	578	546	1,712
Total – real		**289**	**1,118**	**2,806**	**2,815**	**2,796**	**9,825**

Table 35 Restructuring Impact on Terminal Costs

Terminal	Ref	2020 €'000	2021 €'000	2022 €'000	2023 €'000	2024 €'000	Total €'000
Staff costs	1	-	88	197	200	202	687
Other operating	2	50	98	217	216	216	797
ICT Capex	3	0	0	121	119	112	352
Total – real		**50**	**186**	**534**	**535**	**531**	**1,836**

Step Changes from 2019

7.133 RP3 includes significant new projects and changes in policy which has resulted in additional unavoidable costs in 2020-2024 when compared to 2019.

1) RP3 includes the delivery of two significant projects - the new Dublin Tower and the new Contingency En Route Centre located at Ballygirreen. This has resulted in increased depreciation and cost of capital charges, additional manpower to operate the new facilities and ongoing operational costs. ✂
2) An increase in resources and training is required to ensure compliance with regulatory requirements. The plan allows for 5 additional ATCOs and 2 Engineers for safety and compliance.
3) As noted previously, it is Government policy that the IAA's air traffic control activities should be separated from the IAA's functionally separate safety regulation activities. This will result in additional costs to be borne by the ANSP in the areas of payroll costs, pension costs (change in the main pension scheme rate) and operating costs. The plan also includes a provision for an ICT CAPEX spend resulting in higher depreciation charges.
4) ✂
5) ✂
6) Sustainability – Government policy for Climate and Biodiversity emergency - the plan includes a CAPEX project of €5.3 million together with an Opex spend to adhere to the policy on Climate Action. 1.5 FTE's are included for the management of the Sustainability Management Programme.

7.134 The following table highlights the above step changes and are based on our best estimate and are materially accurate. It should be noted that staff costs have been costed at the entry point of the ATCO and SMC pay scales and does not reflect the actual cost of the resources which are currently engaged as part of these new projects and the development of the compliance framework.

En Route/Terminal	**2019**	**2020/2021**	**2022**	**2023**	**2024**	**RP3 €'000**
2017 prices	**€'000**	**€'000**	**€'000**	**€'000**	**€'000**	
CAPEX related						
New Dublin Tower		2,623	6,255	6,736	6,491	22,105
En route contingency centre		2,391	2,298	2,227	2,143	9,059
Sustainability		243	708	1,235	1,806	3,992
✂		✂	✂	✂	✂	✂
Total CAPEX related		**5,257**	**10,067**	**10,989**	**11,188**	**37,501**
OPEX						
New headcount for projects / compliance		119	672	1,538	1,825	4,155
Training cost		0	183	191	189	563
Compliance training		339	190	186	183	898
Other operating costs for new projects		3,650	2,161	2,219	2,269	10,300
Restructuring-related		1,643	2,632	2,653	2,669	9,597
✂		✂	✂	✂	✂	✂
Aireon		✂	✂	✂	✂	✂
Environmental		161	332	332	332	1,157
Total Opex		**5,913**	**6,646**	**7,684**	**8,027**	**28,269**
Total Costs		**11,169**	**16,713**	**18,673**	**19,215**	**65,770**

7.6 Capital Expenditure Requirements in RP3

7.135 This Plan is based on the assumption that the IAA will deliver into operational use capital projects with a value of €159.3 million. The IAA charges its capital costs only when projects have been brought into operational use. While every effort has been made to specifically identify the nature of each proposed capital investment, it is proposed that the IAA will treat its capital allowance for RP3 as a total amount to be capitalised of €159.3 million rather than specific allocations to specific services/type of project.

7.136 The following table details, by service, the projected capitalisation of projects over the course of RP3:

Table 36 The Total Value of Capitalised Projects in RP3

	Value of capitalised projects					
	2020A €'000	**2021 F €'000**	**2022 F €'000**	**2023 F €'000**	**2024 F €'000**	**RP3 €'000**
Air traffic management	9,646	55,270	23,804	15,667	8,879	113,266
Communications	5,262	3,795	3,193	2,909	1,349	16,508
Surveillance	230	1,447	4,769	7,786	2,525	16,757
Navigation	411	542	3,368	2,560	2,789	9,670
ICT Separation	-	-	3,080	-	-	3,080
Total	**15,549**	**61,054**	**38,214**	**28,922**	**15,542**	**159,281**

Table 37 Capital Projects required during RP3

	Dates of Capitalisation	Value of Project €'000
ATM Operations and Technology Projects		
New visual control tower and parallel runway at Dublin	2021-2023	49,856
En Route Contingency Centre	2020	12,454
COOPANS ATM system	2021-2024	9,415
Emergency Air Situation Display System	2022-2023	✂
NAVAIDs replacement programme	2021-2024	✂
RADAR Upgrades	2023-2024	✂
Voice Over Internet Protocol Communication Switch	2021-2024	✂
North Dublin RADAR	2022	✂
Airfield Cabling Works	2022-2023	✂
VHF replacement and frequency expansion	2021-2024	✂
Met Server	2021-2022	✂
ATC Screen Replacement	2023-2024	✂
Rostering System	2022	✂
Nokia IP Network	2020	✂
Simulator	2024	✂
2.6Ghz Radar Filters	2021-2022	✂
Core Network Upgrade	2022	✂
Aireon System	2022	✂
Other ATM Operations and Technology projects	2020-2024	8,322
Total ATM Operations and Technology		**118,265**
Property, Security and ICT Projects		
Plant and equipment upgrades	2022-2024	6,729
Climate action plan	2021-2024	5,300
North Dublin RADAR building	2022	✂
Upgrade of operational buildings	2022-2024	5,580
Security upgrades	2021-2024	✂
Upgrade of remote sites	2021-2024	✂
Other property and security projects	2020-2024	5,823
ICT projects - various	2020-2024	✂
Total Property, Security and ICT projects		37,937
ICT costs separation	2022	✂
Total		159,282

7.137 ✂

7.138 ✂

7.8 Depreciation

7.139 Depreciation is calculated to write off the cost of each fixed asset, including equipment purchased as part of an installation, on a straight-line basis over its expected useful life at the following annual rates:

Buildings	5%
Completed installations and other works	$8^1/_3$% - 12½%
Office Equipment	20% - $33^1/_3$%

7.140 Assets are depreciated from the date they are commissioned for use. Assets under construction/installations in progress are carried at historical cost and are not depreciated until they are brought into use. The carrying amounts of tangible fixed assets are reviewed at each reporting date to determine whether there is any indication of impairment. The charge for depreciation, based on the assets above being capitalised over the course of RP3 is as follows:

Table 38 Depreciation in RP3

Nominal prices	2020 A €'000	2021 F €'000	2022 F €'000	2023 F €'000	2024 F €'000	RP3 Total
En Route	6,606	7,845	9,910	11,342	11,084	**46,787**
Terminal	2,477	3,965	6,470	7,711	8,178	**28,801**
Total	**9,083**	**11,810**	**16,380**	**19,053**	**19,262**	**75,588**

7.141 Depreciation of the new Dublin Tower and associated parallel runway equipment comprises €11.5 million of the RP3 depreciation charge.

7.9 Cost of Capital

7.142 The IAA engaged First Economics to produce an estimate of the IAA's cost of capital for both its en route and terminal services.

7.143 The assumptions used in deriving a range for the cost of capital are as follows:

Table 39 Key components of Cost of Capital

	Low	High
Gearing	0.5	0.5
Cost of debt	0.3%	0.3%
Cost of equity pre tax	9.01%	10.45%
Cost of equity post tax	7.88%	9.14%

7.144 Based on these inputs, the proposed range for the IAA's real pre-tax cost of capital is between 4.7% and 5.4%. This Plan adopts a pre-tax rate of 5%.

7.10 Inflation Assumptions

7.145 In line with Implementing Regulation 2019/317, this Plan assumes an inflation forecast for 2021 to 2024 based on the International Monetary Fund (IMF) Consumer Price Index (CPI). Actual inflation in 2020 was -0.5%, as published by the EC in the Eurostat Harmonised Index of Consumer Prices. In accordance with the Regulation, where the percentage change in inflation is negative, a zero value shall be used. Therefore, in applying the inflation index, 2020 actual inflation is assessed as 0%.

Table 40 Assumed Inflation Rate 2020-2024

2020	2021	2022	2023	2024
0.0%	1.6%	1.9%	2.0%	2.0%

Key Points to note in relation to Required Costs over the period 2020-2024
1. An additional 14 ATCOs will be required to service the new runway for an 18-hour period from 2023. This is driven by the daa decision to develop a new runway to support traffic growth at Dublin airport and the requirement for the parallel runway operations.
2. Single person en-route sectors and staffing to workload are initiatives designed to ensure continued service efficiency. Moreover, routing restrictions within and around Irish controlled airspace will inevitably lead to the extension of flight routes and negatively impact our horizontal en-route environmental performance.
3. An increase of 9.5 staff is required to support the ANSP through management of its operations, safety management and improvement, regulation 373 obligations, airspace design and ATCO training.
4. An increase in Engineers from 72 to 94 over the RP3 period is required to support current operational systems and deliver future systems into operation, as well as supporting initiatives required by Government policy (e.g. sustainability, EGNOS) and ongoing maintenance of IAA sites and equipment (ensuring business continuity).
5. The total value of capitalised projects across en route and terminal in RP3 is expected to be €159.3m, which equates to €31.9m per annum on average. This can only be delivered if staff levels outlined in the plan are provided for.

8 Implementing Regulation (EU) 2017/373

Commission Implementing Regulation (EU) No 2017/373 is a comprehensive wide-ranging regulation which lays down common requirements for providers of Air Traffic Management (ATM), Air Navigation Services (ANS) and other air traffic management network functions and their oversight. It repealed Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amended Regulation (EU) No 677/2011. The Regulation entered into force on March 1st, 2017 and has applied from January 2nd, 2020.

As defined under Regulation (EU) 2017/373, the IAA Service Provider provides ATM and ANS services. Key focus areas of the Regulation for the Service Provider are compliance monitoring; quality management; the management, assessment and oversight of changes, ATSEP (Air Traffic Safety Electronics Personnel) training and competence and more general training and competence across the entire service provider.

The Regulation contains 13 Annexes which include:

- Annex II - Requirements for competent authority oversight of services.
- Annex III & Annex IV - Requirements for service providers.
- Annex V - Requirements for aeronautical information services.
- Annex XIII - Requirements for ATSEP [Air Traffic Services Electronics Personnel] training and competence assessment.

Regulation (EU) 2017/373 has already been subject to a limited number of amendments by Regulation (EU) 2020/469 which will apply from 2022. The regulation transposes large parts of ICAO Doc 4444 into EU regulation with associated Acceptable Means of Compliance containing detailed requirements. This Regulation change will require significant changes to the ANSP MATS 1 [Manual of Air Traffic Services] and will also require updates to unit MATS 2 manuals.

The regulatory and administrative burden of developing, implementing and maintaining the required safety, quality and management processes and procedures to ensure compliance with this and other similar such regulations [e.g. Regulation (EU) 2015/340] and standards [ISO 9001:2015] is sizeable. Traditionally the IAA has been very “lean” in these areas and we are having to increase resources to ensure compliance with regulatory requirements, NSAI standards and industry best practice across the entire service provider. This is as a result of the detailed and specific nature of the Regulation, the requirement for system wide (functional and non-functional) oversight and compliance, the increased monitoring and reporting requirements, training requirements and the revised and more intensive regulatory approach involved.

There are 3 main drivers for the increase in engineering headcount:

- Additional Systems to Monitor and Maintain, (+10)
- Additional Regulatory Requirements, (+6)
- A Larger Capital Plan, (+6)

It is important to recognise that the delivery of required capital projects will be greatly compromised if there are insufficient numbers of engineers in place during RP3. During RP2, there were times in which resources were diverted from capital projects in order to ensure the delivery of a safe service that met acceptable levels of quality. By prioritising service delivery, it adversely affected project delivery. Given the prospects of capital projects being monitored by the NSAs, via reporting in the public domain, it is

important that any such monitoring is clear about recruitment levels permitted by the NSAs under the RP3 Performance Plan compared to the requirement that had been identified by IAA ANSP in this Business Plan. Furthermore, the NSAs should have regard for the potential implications of monitoring the delivery of projects and ensure it does not have any unintended consequences such as inadvertently compromising the safe delivery of our services (i.e. staff required to focus on reporting rather than core service provision).

✂

Pre-Regulation (EU) 2017/373	Regulation (EU) 2017/373

▪ **3 Units Safety Managers**
▪ 0.5 Quality
▪ **1 Manager ATM Standards & Procedures**
	▪ **3 Unit Safety Managers**
	  ○ 3 Unit Safety Managers Supports
	  ○ 2 Unit Safety Managers Admin
	▪ 4 Quality/Compliance/Security
	▪ 1 Compliance Manager
	▪ **1 Manager ATM Standards & Procedures**
	  ○ 1 ATM Standards & Procedures Support
	▪ 2 Training Development staff

Tech Services: EU Regulation 2017/373 Requirements

This Regulation runs right across all the IAA ANSP does so it is very difficult to give full impacts without simply describing each individual aspect of the overall service provision (communications, surveillance, flight data, monitoring, navigation, maintenance etc) which of course the NSAs are familiar with. Also while here has been a step-change involved in implementing and complying with the Regulation from the start of 2020, the IAA has not had a step-change in resources (the nature of the RP3 process dictated that an RP3 plan was not approved in advance of the start of 2020) and so we have had to evolve in terms of our approach to ensuring that staff are aware of the obligations and requirements of the Regulation and move to the new compliance system. It is only as the IAA ANSP has set about the task of complying with and implementing the requirements of regulation 373, that the full implications of the Regulation in terms of staff requirements and resources were fully understood.

We have focussed here on 2 of the most significant changes:

1. Training and Competency
2. Security Management

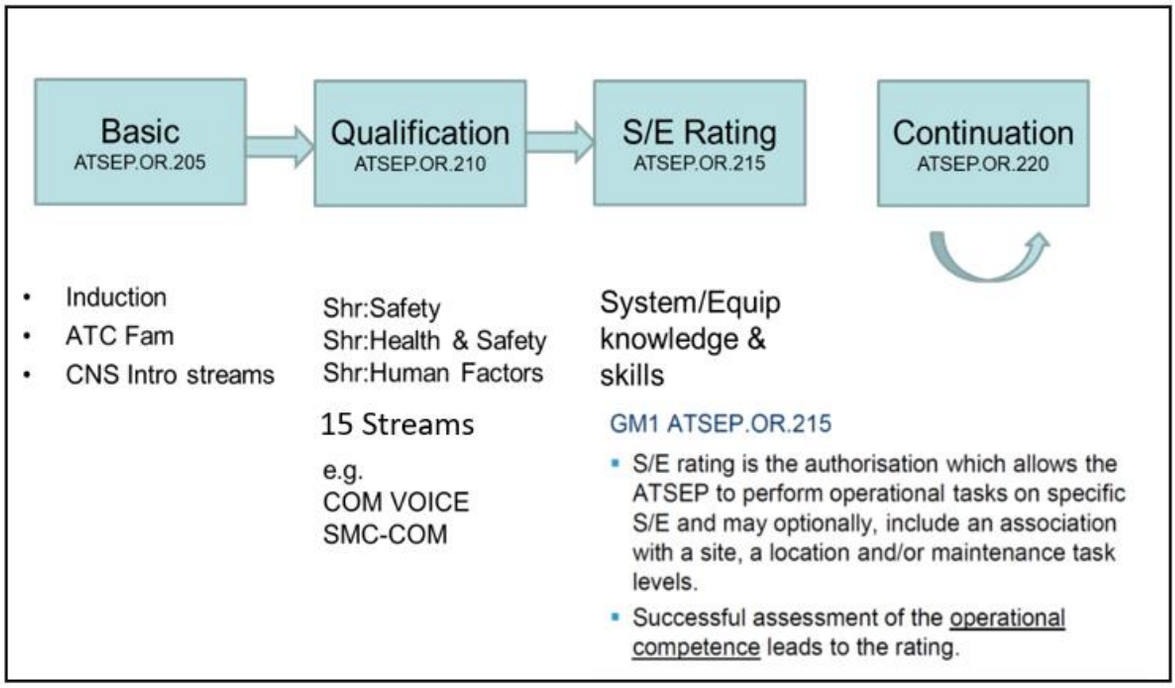
There are also changes to Change Management, Quality Management etc.

373 is not the only significant regulatory change impacting on the IAA ANSP at this time. Also of relevance and driver of increased costs are the NIS Directive, Ambient Recording and all the CP1 changes approved/ driven at European level, in pursuit of the delivery of the European wide ATM master plan

ATSEP (Engineering) Training Resource Requirements

ATSEP (Air Traffic Safety Engineering/Electronics Personnel) Training is highly regulated under EU Regulation 2017/373 Annex XIII (Part-PERS). Only fully qualified and compliant ATSEPs can carry out a range of works related to the functional ATM system. All ATSEPS must undertake phases training consisting of Basic, Qualification, S/E rating and Continuation Training as per Figure 1 below. The competency assessment regime also mandates periodic assessments (2 yearly for SMCs, 3 yearly for Level B engineers). Such assessments can only be conducted by trained competency assessors who have completed EPNI's assessor course. These requirements limit IAA's ability to "outsource" works and impose significant costs involved in training, assessing and maintaining compliance amongst staff.

In addition to requirements under 2017/373 ATSEPs depending on their location/role must also complete mandatory airport authority training (e.g. airfield driving) and mandatory ANSP general training (e.g. first aid, safety management system training). ***It is also vital to note that, due to the 24/7 nature of Operational rostered work, many of the courses provided to SMC engineers will require multiple runs to ensure all staff are covered (i.e. staff availability due to rostering and service continuity requirements).***



✂

ATM/ANS OR D.010 EU REGULATION 373

IAA technical services response to Regulatory Requirements

Throughout the presentation there were a number of references to Regulation 373/2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight driving new requirements and processes. Please could IAA specifically map the requirements (referencing the clauses in the legislation) to additional manpower, systems and other additional cost requirements?

Regulation (EU) 2017/373 – Security Regulation

a. Air navigation services and air traffic flow management providers and the Network Manager shall, as an integral part of their management system as required in point ATM/ANS.OR.B.005, establish a security management system to ensure:

1. the security of their facilities and personnel so as to prevent unlawful interference with the provision of services;
2. the security of operational data they receive, or produce, or otherwise employ, so that access to it is restricted only to those authorised.

b. The security management system shall define:

1. the procedures relating to security risk assessment and mitigation, security monitoring and improvement, security reviews and lesson dissemination;

2. the means designed to detect security breaches and to alert personnel with appropriate security warnings;
3. the means of controlling the effects of security breaches and to identify recovery action and mitigation procedures to prevent re-occurrence.

c. Air navigation services and air traffic flow management providers and the Network Manager shall ensure the security clearance of their personnel, if appropriate, and coordinate with the relevant civil and military authorities to ensure the security of their facilities, personnel and data.

d. Air navigation services and air traffic flow management providers and the Network Manager shall take the necessary measures to protect their systems, constituents in use and data and prevent compromising the network against information and cyber security threats which may have an unlawful interference with the provision of their service.

Requirements for IAA ATM systems
Notes – IAA Operational Security and the overarching Security Management system (SeMS) cannot fully address the items highlighted above namely B2,3 and D. Such functionality requires a Security Incident Event Manager and Security Operations Centre (SOC)

In order to address these requirements and requirements within the NIS Directive the ANSP needs to acquire further detection capability, which will support restore and recovery from a security event or incident.

Project T001 will address this requirement and a budget of €750,000 is approved to address the implementation of Security Test facility and SIEM. The project operational cost for Security Operations support is estimated at €70-100k and allows for a sharing of this function between IAA ICT and ATM system

The Solution (SIEM)
SIEM passively reviews the logs from the output of our network elements and seeks out anomalous behaviour and provides alerts. This facility will allow us respond and isolate an incident or security event and will support the investigation and recovery. This requirement will be in partnership with IAA ICT department. The ATM "SIEM" will be acquired as an on-premises solution consistent with our approach of non-internet facing systems for added security.

Security Operations Centre
This is an external technical centre who will review system logs in Real Time or Near Real time and provide timely alerts to the IAA technical control desk to instigate required actions to control an incident.

Resourcing
The IAA Networks and Security Team will be resourced as 1 x ATM Security Specialist who will act as project lead to manage our compliance effort and inform strategy and design within the ATM system. The lead will be supported by 2 dedicated security engineers to support the management of the system and work with industry partners.

Conclusion
Technical Services have built the system with security and safety in mind and our Air Gap and how we manage trusted third-party access is a strength. This does not lead to complacent approach and our risk-based approach seeks ongoing development of technical controls and mitigations. The security projects are based on agreed corrective action plans with our Competent Authorities which will enhance the security of our overall ATM systems.

Operations: Regulation (EU) 2017/373 Requirements

Pre-Regulation (EU) 2017/373	Regulation (EU) 2017/373

▪ **3 Units Safety Managers**
▪ 0.5 Quality
▪ **1 ATM Standards & Procedures Domain**
	▪ **3 Unit Safety Managers**
	  ○ 3 Unit Safety Managers Supports
	  ○ 2 Unit Safety Managers Admin Supports
	▪ 4 Quality/Compliance/Security
	▪ 1 Compliance Manager
	▪ **1 ATM Standards & Procedures**
	  ○ 1 ATM Standards & Procedures Support
	▪ 2 Training Development staff

Key focus areas of Regulation (EU) 2017/373 for the Service Provider are

1) compliance monitoring,
2) quality management,
3) the management, assessment, and oversight of changes,
4) ATSEP (Air Traffic Safety Electronics Personnel) training and competence and
5) general training and competence for all staff across the entire ANSP.

Regulatory changes in these areas have resulted in:

- significant revisions to existing procedures, not just in Operations & Technology but across the entire ANSP [HR, quality etc.]
- a complete revision of the Safety Management Manual which details all aspects of the ANSP's Safety Management System [SMS] including:
  - the Safety Management Policy & Principles
  - the Safety Management organisation
  - all Safety Management procedures
  - individual and collective Safety Management responsibilities and accountabilities
- the introduction of numerous new procedures & processes with an associated increased volume of forms & records particularly in the area of change management to the functional system [e.g. COOPANS] and the non-functional system [general procedures]
- detailed ATSEP training and competence requirements
- the definition of competences required for all roles within the ANSP and the development of specific training tailored to ensure all staff are trained and competent to perform their duties, particularly with respect to safety, and remain so on an ongoing basis
- increased compliance & quality requirements throughout the entire ANSP including the appointment of a Compliance Manager

These regulatory changes have resulted in a huge increase in workload necessitating certain structural changes [implementation of an integrated management system, appointment of a Compliance Manager, appointment of USM supports, training development, etc.] within the ANSP to obtain certification and ensure ongoing compliance post-certification.

Reference documents:

CI Regulation (EU) 2017/373

EASA Easy Access Rules for ATM/ANS Regulation (EU) 2017/373

Integrated Management System, Quality & Staff Training & Competence

(Reg (EU) 2017/373: ATM/ANS.OR.B.005) Management System [17 pages of supporting text]

(a) A service provider shall implement and maintain a management system that includes:

(1) clearly defined lines of responsibility and accountability throughout its organisation, including a direct accountability of the accountable manager;
(2) a description of the overall philosophies and principles of the service provider with regard to ***safety, quality, and security of its services****, collectively constituting a policy, signed by the accountable manager;*
(3) the means to verify the performance of the service provider's organisation in light of the performance indicators and performance targets of the management system;
(4) ***a process to identify changes within the service provider's organisation and the context in which it operates, which may affect established processes, procedures and services and, where necessary, change the management system and/or the functional system to accommodate those changes****;*
(5) a process to review the management system, identify the causes of substandard performance of the management system, determine the implications of such substandard performance, and eliminate or mitigate such causes;
(6) ***a process to ensure that the personnel of the service provider are trained and competent to perform their duties in a safe, efficient, continuous and sustainable manner. In this context, the service provider shall establish policies for the recruitments and training of its personnel****;*
(7) a formal means for communication that ensures that all personnel of the service provider are fully aware of the management system that allows critical information to be conveyed and that makes it possible to explain why particular actions are taken and why procedures are introduced or changed.

(b) A service provider shall document all management system key processes, including a process for making personnel aware of their responsibilities, and the procedure for the amendment of those processes.

(c) ***A service provider shall establish a function to monitor compliance of its organisation*** *with the applicable requirements and the adequacy of the procedures. Compliance monitoring shall include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary.*

(d) A service provider shall monitor the behaviour of its functional system and, where underperformance is identified, it shall establish its causes and eliminate them or, after having determined the implication of the underperformance, mitigate its effects.

(e) The management system shall be proportionate to the size of the service provider and the complexity of its activities, taking into account the hazards and associated risks inherent in those activities.

(f) Within its management system, the service provider shall establish formal interfaces with the relevant service providers and aviation undertakings in order to:

(1) ensure that the aviation safety hazards entailed by its activities are identified and evaluated, and the associated risks are managed and mitigated as appropriate;

(2) ensure that it provides its services in accordance with the requirements of this Regulation.

(g) In the case that the service provider holds also an aerodrome operator certificate, it shall ensure that the management system covers all activities in the scope of its certificates.

Compliance Manager

Reg (EU) 2017/373: ATM/ANS.OR.B.005 (c). Management System

(c) A service provider shall establish a function to monitor compliance of its organisation with the applicable requirements and the adequacy of the procedures. Compliance monitoring shall include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary.

GM1 ATM/ANS.OR.B.005 Management System

Traditionally, separate management systems were developed to address issues such as safety, quality, environment, health and safety, finance, human resources, information technology and data protection. ***However, it is foreseen that more and more the services providers will establish integrated management systems*** *following the harmonised set of requirements in this Regulation. The Regulation does not require that the different management systems are integrated but it facilitates their integration.*

Reg (EU) 2017/373 ATM/ANS.OR.B.020 (b). Personnel Requirements

A service provider shall define the authority, duties and responsibilities of the nominated post holders, in particular of the ***management personnel in charge of safety, quality, security, finance and human resources-related*** *functions as applicable.*

Reg (EU) 2017/373 ATM/ANS.OR.B.005 (a) (6). Management System

A service provider shall implement and maintain a management system that includes a process to ensure that the personnel of the service provider are trained and competent to perform their duties in a safe, efficient, continuous and sustainable manner. *In this context, the service provider shall establish policies for the recruitments and training of its personnel.*

Reg (EU) 2017/373 ATS.OR.D.010 (a). Security Management

(a) Air navigation services shall, ***as an integral part of their management system*** *as required in point ATM/ANS.OR.B.005,* ***establish a security management system*** *to ensure:*

(1) the security of their facilities and personnel so as to prevent unlawful interference with the provision of services;

(2) the security of operational data they receive, or produce, or otherwise employ, so that access to it is restricted only to those authorised.

(b) The security management system shall define:

(1) the procedures relating to security risk assessment and mitigation, security monitoring and improvement, security reviews and lesson dissemination;

(2) the means designed to detect security breaches and to alert personnel with appropriate security warnings;

(3) the means of controlling the effects of security breaches and to identify recovery action and mitigation procedures to prevent re-occurrence.

(c) Air navigation services and air traffic flow management providers and the Network Manager shall ensure the security clearance of their personnel, if appropriate, and coordinate with the relevant civil and military authorities to ensure the security of their facilities, personnel and data.

(d) Air navigation services and air traffic flow management providers and the Network Manager shall take the necessary measures to protect their systems, constituents in use and data and prevent compromising the network against information and cyber security threats which may have an unlawful interference with the provision of their service.

ATS.OR.200. Safety Management System [12 pages of supporting text]

An air traffic services provider shall have in place a safety management system (SMS), which may be an integral part of the management system required in point ATM/ANS.OR.B.005, that includes the following components.

(1) Safety policy and objectives

(i) Management commitment and responsibility regarding safety which shall be included in the safety policy.

(ii) Safety accountabilities regarding the implementation and maintenance of the SMS and the authority to make decisions regarding safety.

(iii) Appointment of a safety manager who is responsible for the implementation and maintenance of an effective SMS;

(iv) ***Coordination of an emergency response planning with other service providers and aviation undertakings that interface with the ATS provider during the provision of its services.***

(v) SMS documentation that describes all the elements of the SMS, the associated SMS processes and the SMS outputs.

(2) ***Safety risk management***

(i) A process to identify hazards associated to its services which shall be based on a combination of reactive, proactive and predictive methods of safety data collection.

(ii) A process that ensures analysis, assessment and control of the safety risks associated with identified hazards.

(iii) A process to ensure that its contribution to the risk of aircraft accidents is minimised as far as is reasonably practicable.

(3) Safety assurance

(i) Safety performance monitoring and measurement means to verify the safety performance of the organisation and validate the effectiveness of the safety risk controls.

(ii) A process to identify changes which may affect the level of safety risk associated with its service and to identify and manage the safety risks that may arise from those changes.

(iii) A process to monitor and assess the effectiveness of the SMS to enable the continuous improvement of the overall performance of the SMS.

(4) Safety promotion

(i) Training programme that ensures that the personnel are trained and competent to perform their SMS duties.

(ii) *Safety communication that ensures that the personnel are aware of the SMS implementation.*

Management, Assessment and Oversight of Changes

Reg (EU) 2017/373 ATM/ANS.OR.B.010. Change Management Procedures

(a) A service provider shall use procedures to manage, assess and, if necessary, mitigate the impact of changes to its functional systems in accordance with points ATM/ANS.OR.A.045, ATM/ANS.OR.C.005, ATS.OR.205 and ATS.OR.210, as applicable.

(b) The procedures referred to in point (a) or any material modifications to those procedures shall:
(1) be submitted, for approval, by the service provider to the competent authority;
(2) not be used until approved by the competent authority.
(c) When the approved procedures referred to in point (b) are not suitable for a particular change, the service provider shall:
(1) make a request to the competent authority for an exemption to deviate from the approved procedures;
(2) provide the details of the deviation and the justification for its use to the competent authority;
(3) not use the deviation before being approved by the competent authority.

Reg (EU) 2017/373 ATM/ANS.OR.A.040. Changes - General

a) *The notification and management of:*
(1) a change to the functional system or a change that affects the functional system shall be carried out in accordance with point ATM/ANS.OR.A.045;
(2) a change to the provision of service, the service provider's management system and/or safety management system, that does not affect the functional system, shall be carried out in accordance with point (b).
(b) Any change as referred to in point (a)(2) shall require prior approval before implementation, unless such a change is notified and managed in accordance with a procedure approved by the competent authority as laid down in point ATM.ANS.AR.C.025(c).

Reg (EU) 2017/373 ATM/ANS.OR.A.045. Changes to a Functional System

(a) A service provider planning a change to its functional system shall:
(1) notify the competent authority of the change;
(2) provide the competent authority, if requested, with any additional information that allows the competent authority to decide whether or not to review the argument for the change;
(3) inform other service providers and, where feasible, aviation undertakings affected by the planned change.
(b) Having notified a change, the service provider shall inform the competent authority whenever the information provided in accordance with points (a)(1) and (2) is materially modified, and the relevant service providers and aviation undertakings whenever the information provided in accordance with point (a)(3) is materially modified.
(c) A service provider shall only allow the parts of the change, for which the activities required by the procedures referred to in point ATM/ANS.OR.B.010 have been completed, to enter into operational service.
(d) If the change is subject to competent authority review in accordance with point ATM/ANS.AR.C.035, the service provider shall only allow the parts of the change for which the competent authority has approved the argument to enter into operational service.
(e) When a change affects other service providers and/or aviation undertakings, as identified in point (a)(3), the service provider and these other service providers, in coordination, shall determine:
(1) the dependencies with each other and, where feasible, with the affected aviation undertakings;
(2) the assumptions and risk mitigations that relate to more than one service provider or aviation undertaking.
(f) Those service providers affected by the assumptions and risk mitigations referred to in point (e)(2) shall only use, in their argument for the change, agreed and aligned assumptions and risk mitigations with each other and, where feasible, with aviation undertakings.

Reg (EU) 2017/373 ATM/ANS.OR.B.010. Change Management Procedures

(a) A service provider shall use procedures to manage, assess and, if necessary, mitigate the impact of changes to its functional systems in accordance with points ATM/ANS.OR.A.045, ATM/ANS.OR.C.005, ATS.OR.205 and ATS.OR.210, as applicable.

(b) The procedures referred to in point (a) or any material modifications to those procedures shall:

(1) be submitted, for approval, by the service provider to the competent authority;

(2) not be used until approved by the competent authority.

(c) When the approved procedures referred to in point (b) are not suitable for a particular change, the service provider shall:

(1) make a request to the competent authority for an exemption to deviate from the approved procedures;

(2) provide the details of the deviation and the justification for its use to the competent authority;

(3) not use the deviation before being approved by the competent authority.

Reg (EU) 2017/373 ATS.OR.205. Safety assessment and assurance of changes to the functional system [29 pages of supporting text]

(a) For any change notified in accordance with point ATM/ANS.OR.A.045(a)(1), the air traffic services provider shall:

(1) ensure that a safety assessment is carried out covering the scope of the change, which is:

(i) the equipment, procedural and human elements being changed;

(ii) interfaces and interactions between the elements being changed and the remainder of the functional system;

(iii) interfaces and interactions between the elements being changed and the context in which it is intended to operate;

(iv) the life cycle of the change from definition to operations including transition into service;

(v) planned degraded modes of operation of the functional system; and

(2) provide assurance, with sufficient confidence, via a complete, documented and valid argument that the safety criteria identified via the application of point ATS.OR.210 are valid, will be satisfied and will remain satisfied.

(b) An air traffic services provider shall ensure that the safety assessment referred to in point (a) comprises:

(1) the identification of hazards;

(2) the determination and justification of the safety criteria applicable to the change in accordance with point ATS.OR.210;

(3) the risk analysis of the effects related to the change;

(4) the risk evaluation and, if required, risk mitigation for the change such that it can meet the applicable safety criteria;

(5) the verification that:

(i) the assessment corresponds to the scope of the change as defined in point (a)(1);

(ii) the change meets the safety criteria;

(6) the specification of the monitoring criteria necessary to demonstrate that the service delivered by the changed functional system will continue to meet the safety criteria.

Reg (EU) 2017/373 ATS.OR.210. Safety Criteria [3 pages of supporting text]

(a) An air traffic services provider shall determine the safety acceptability of a change to a functional system, based on the analysis of the risks posed by the introduction of the change, differentiated on basis of types of operations and stakeholder classes, as appropriate.

(b) The safety acceptability of a change shall be assessed by using specific and verifiable safety criteria, where each criterion is expressed in terms of an explicit, quantitative level of safety risk or another measure that relates to safety risk.

(c) An air traffic services provider shall ensure that the safety criteria:

(1) are justified for the specific change, taking into account the type of change;

(2) when fulfilled, predict that the functional system after the change will be as safe as it was before the change or the air traffic services provider shall provide an argument justifying that:

(i) any temporary reduction in safety will be offset by future improvement in safety; or

(ii) any permanent reduction in safety has other beneficial consequences;

(3) when taken collectively, ensure that the change does not create an unacceptable risk to the safety of the service;

(4) support the improvement of safety whenever reasonably practicable.

ATSEP

A complete ANNEX dedicated to ATSEP training & competence [149 pages of supporting text]

ANNEX XIII — PART-PERS
REQUIREMENTS FOR SERVICE PROVIDERS CONCERNING PERSONNEL TRAINING AND COMPETENCE ASSESSMENT

9 Conclusion

This section contains a non-exhaustive list of key points from each of the previous seven sections.

RP2 performance and the approach taken in this Business Plan
1. During RP2 the performance if IAA ANSP was consistently among the top performers in Europe in addition to having one of the lowest unit rates.
2. Safety will always be prioritised by the IAA ANSP, but it requires continued focus and dedication and it should never be taken for granted.
3. IAA ANSP is committed to voluntarily returning all of the unspent Capital Expenditure from RP2
4. With long lead-in times for both staffing and investments, an ANSP does not experience a linear effect with regard to resource allocation and service delivery
5. This Business Plan identifies a complete list of costs that are required to ensure an acceptable service is provided as the industry recovers from the pandemic

Background Material
1. The EC did not complete its review of the original Draft RP3 Plan in Q1 2020 due to the pandemic and a revised RP3 Regulation followed in November 2020
2. This revised Draft Business Plan has been prepared at a time of continued uncertainty surrounding the nature of the recovery in air travel
3. IAA ANSP has implemented a phased cost containment programme since March 2020 with payroll reduction measures in place until January 2022
4. Amidst the regulatory and traffic uncertainty, almost half of the five-year RP3 period will have elapsed without an approved RP3 Plan
5. IAA ANSP has fully engaged with the relevant consultation requirements and is keen to meet NSA expectations with this revised RP3 Business Plan

The Revised RP3 Regulatory Framework
1. IAA ANSP commenced 2020 with budgets and plans predicated on expected growth and the Draft RP3 Plans submitted to the EC in Q4 2019
2. Significant regulatory uncertainty prevailed in 2020 until the RP3 Regulation was revised in November 2020 - traffic related uncertainty has continued since
3. The EC note in its Draft Implementing Decision that *it is understandable that air navigation service providers are not fully able to adjust their cost bases in line with such an unprecedented drop in traffic, due to the high share of fixed costs and the obligation to continuously maintain the availability of services*
4. There has been a severe lack of guidance from the PRB on how ANSPs can comply with the proposed cost efficiency targets
5. The EC also stated that ANSPs should be able to respond to the circumstances deriving from the crisis while building up capabilities to meet future traffic demand and addressing the structural issues impacting operational performance.

The needs of our customers
1. The results of the 2019 independent survey show that the overall level of Customer Satisfaction with the IAA was 90.2%.
2. Low Delays was ranked first in terms of importance followed by operational resilience and low user charges.
3. It became clear in 2020 that our Customers were concerned that the suspension of ATCO training programmes would lead to capacity issues during the recovery
4. Low user charges ranked first in terms of importance in feedback from customers in 2020, up from third place in 2019. It was followed by low delay
5. Throughout the pandemic IAA ANSP has undertaken several initiatives that demonstrate it has high regard for Customer interest. We extended financial relief from en route to terminal activities, availed of the EWSS Scheme and continued to honour our commitment to return unspent capital expenditure in full.
6. Of the 27 European charging zones presented, IAA ANSP had the second lowest en route charge in 2021

En Route and Terminal Traffic
1. For a prolonged period in 2020, there was a general expectation that traffic could rebound rapidly following the record decline
2. Reputable industry bodies regularly revised projections downwards, which continued through Q1 2021 with deteriorating epidemiological situation
3. Traffic Scenarios became available one day after the revised RP3 Regulation in November, and ANSPs have been asked to revise RP3 Plans on this basis
4. There is a real cost of providing an essential service of which traffic is just one of many contributing factors

Performance of IAA ANSP
1. This Plan includes a baseline of costs involved in all aspects of safety including monitoring, checking, training, systems, data analysis, promotion and safety intelligence
2. Due to the lead times involved in recruiting and training frontline ANSP staff, it follows that a decision on the required resources/capacity in 2024 needs to be made at the beginning of 2022
3. All stakeholders need to recognise the significant risk to future capacity levels that are associated with excessive cost containment during RP3
4. The PRB has calculated the environment targets for Ireland on the basis of historic performance and feedback from stakeholders but this has led to targets that are fundamentally flawed as they do not consider the implications of onerous cost efficiency targets on required resources
5. From a cost efficiency perspective, it is essential to recognise the extant level of efficiency and the key cost drivers outlined in the Plan in order to ensure the service provision is not unduly degraded

Required Costs over the period 2020-2024
1. An additional 14 ATCOs will be required to service the new runway for an 18-hour period from 2023
2. Single person en-route sectors and staffing to workload are initiatives designed to ensure continued service efficiency. Moreover, routing restrictions within and around Irish controlled airspace will inevitably lead to the extension of flight routes and negatively impact our horizontal en-route environmental performance.
3. An increase of 9.5 staff is required to support the ANSP through management of its operations, safety management and improvement, regulation 373 obligations, airspace design and ATCO training
4. An increase in Engineers from 72 to 94 over the RP3 period is required to support current operational systems and deliver future systems into operation, as well as supporting initiatives required by Government policy (e.g. sustainability, EGNOS) and ongoing maintenance of IAA sites and equipment (ensuring business continuity).
5. The total value of capitalised projects across en route and terminal in RP3 is expected to be €159.3m, which equates to €31.9m per annum on average. This can only be delivered if staff levels outlined in the plan are provided for.

Appendix 1 Property/Security Project Sheets

Conditional Survey Works

Project Summary

Essential Conditional Survey Upgrade Works at IAA Facilities

Project Details Summary	Conditional Survey Works are required at 13 IAA facilities around the country to ensure they remain structurally sound and remain fit for purpose. The works are focused on new and replacement requirements to ensure the longevity of the ageing buildings. The scope of the conditional surveys works include for: • Roof Replacement Works • Structural Upgrades • Mechanical and Electrical • Cladding Replacements • Site and Boundary Upgrades The objective is to ensure that essential upgrade works are undertaken at IAA facilities over a 4-year period. The works will be scheduled on a priority basis.
Category	
RP3-Conditional Works	Malin Head Radar, Cork Air Traffic Control Tower, Mt. Gabriel Radar 1&2, Urlanmore Communications Site, Shannon Air Traffic Control Tower, Kilkee VHF site, Dublin Radar 2 & 3 buildings, En-route Contingency Centre, Ballycasey Centre and Rosslare VHF site.
Primary Driver	Building Conditional Upgrades
Secondary Driver	Operational Efficiency
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	Supervision by IAA Engineering personnel
Project Output	Conditionally sound IAA facilities
Asset life	10 years

Key Information / Benefits

- Regulatory and Legal Compliance.
- Essential new and replacement works.
- Energy Efficiency.
- Essential new and replacement works over a 4-year programme.
- Assurance that critical IAA Operational equipment is protected from damage due to deterioration of the buildings.
- Assurance that all works are completed by competent contractors providing conditionally sound buildings which will sustain for an estimated 10-year life for all upgrades.
- Prolong the longevity of the buildings and their contents.
- Ongoing investment reduces potential for issues to escalate to a major or emergency status.
- Reliable and appropriate environment for Operational and Engineering personnel ensuring that the IAA can deliver a service to meet customer expectations.
- Staff / Contractors – improved and safer facility.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance.

Security Upgrade Works

✂

National Security System Network

✂

Fire Suppression System

Project Summary

Fire Suppression Systems Installation at IAA Facilities

Project Details Summary	The installation / replacement of fire suppression systems across 8 IAA facilities is to ensure the replacement of end of life and installation of new essential fire suppression systems and associated electrical / civil works at IAA remote facilities. This project will be delivered by competent 3rd party contractors following a full public procurement tender process and will be overseen by a 3rd party project management company. All works will be completed to building regulations and all material removed from site will be disposed of in an environmentally friendly manner.
Category	
RP3-Fire	Malin Head Radar, Dooncarton Radar, Shannon Radar, Woodcock Hill Radar, Mt. Gabriel Radar 1&2 buildings and Dublin Radar 1 & 3 buildings.
Primary Driver	Fire Safety Regulatory Compliance
Secondary Driver	Operational Safety / Fire Safety Compliance
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	- Supervision by IAA Engineering personnel - Service contract via IAA FM contracted services
Project Output	Appropriate Fire Suppression Systems to protect Operational Equipment and prevent interruption to service.
Asset life	10 years

Key Information / Benefits

- Regulatory Compliance
- Essential replacement of end-of-life equipment
- Assurance that critical IAA Operational equipment is appropriately protected from damage arising from end-of life equipment
- Reduces potential for major or emergency status situation
- Reliable and appropriate fire safety environment for Operational and Engineering equipment ensuring that the IAA can deliver a service to meet customer expectations.
- Staff / Contractors – improved and safer facility
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance

Plant Upgrade Works

Project Summary

Essential Building Plant and Equipment Replacement Programme

Project Details Summary	This project will ensure the replacement of end-of-life essential mechanical plant and equipment as well as associated electrical/civil works at 15 IAA facilities. This equipment includes air handling systems, chillers and boilers which are at end-of-life and require replacement to ensure continuity of service and the provision of essential cooling/heating for IAA Operational Centres and remote sites. This project will be delivered by competent 3rd party contractors following a full public procurement tender process and will be overseen by a 3rd party project management company. All works will be completed to building regulations and all material removed from site will be disposed of in an environmentally friendly manner.
Category	
RP3-Plant	Malin Head Radar, Shannon Radar, Cork Air Traffic Control Tower, Mt. Gabriel Radar 1&2 buildings, Urlanmore Communications building, Shannon Air Traffic Control Tower, Dooncarton Radar, Woodcock Hill Radar, Dublin Radar 1& 2 buildings, Ballycasey Centre, Dublin ACC Centre and The Times Building (HQ).
Primary Driver	Business and Regulatory Requirements
Secondary Driver	- Operational Safety / Efficiency - State SEAI / Climate Action Plans and targets
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	- Supervision by IAA Engineering personnel - Service contract via IAA FM contracted services
Project Output	Modern energy efficient plant and equipment for IAA Operational Centres and remote sites to ensure adequate heating and cooling systems for Operational Equipment and Personnel.
Asset life	10 years

Key Information / Benefits

- Regulatory and Legal Compliance.
- Essential replacement plant, equipment and associated works.
- Energy Efficiency.
- Assurance that critical IAA Operational equipment is protected from damage due to deterioration of existing end of life plant and equipment.
- Assurance that all works are completed by competent contractors providing suitable equipment which will sustain for an estimated 10-year life for all upgrades.
- Prolong the longevity of equipment reliant on the plant.
- Enhanced control / management capabilities with advancement in technology.
- Ongoing investment reduces potential for issues to escalate to a major or emergency status
- Reliable and appropriate environment for Operational and Engineering personnel ensuring that the IAA can deliver a service to meet customer expectations.
- Operational Safety.
- Staff / Contractors – improved and safer facility.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance.

Cork ATC Building Extension

Project Summary

Cork Air Traffic Control Tower Building Extension

Project Details Summary	This project provides for a 225sq.mt. extension to the existing Cork ATC Tower building which will address the long-term shortage of required space. This extension provides for the following • Office spaces • Equipment storeroom • Rest room • Meeting room • Welfare facilities This project will be delivered by competent 3rd party contractors following a full public procurement tender process and will be overseen by a 3rd party project management company. All works will be completed to building regulations and all material removed from site will be disposed of in an environmentally friendly manner.
Category	
RP3-Conditional Works	Cork Air Traffic Control Tower building.
Primary Driver	Structural Requirements
Secondary Driver	Operational Efficiency / Service Delivery
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	- Supervision by IAA Engineering personnel - Internal resources for management, procurement and finance services
Project Output	Provision of required additional space at the Cork Air Traffic Control Tower building
Asset life	25 years

Key Information / Benefits

- Regulatory and Legal Compliance
- Essential new accommodation space to address the long-term shortage of required space. This extension provides for the following:
    - Office spaces
    - Equipment storeroom
    - Rest/fatigue space
    - Meeting room
    - Welfare facilities
- Energy Efficiency
- Assurance that critical IAA Operations is maintained by the provision of appropriate and suitable accommodation
- Ongoing investment reduces potential for issues to escalate to a major or emergency status
- Reliable and appropriate environment for Operational and Engineering Staff ensuring that the IAA can deliver a service to meet customer expectations.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance.

Structural Upgrade Works

Project Summary

Essential Structural Integrity Works at Key IAA Centres

Project Details Summary	This project provides essential structural integrity upgrade works to protect the building infrastructure and the IAA people, systems and equipment contained within. These works are being undertaken given the age of the respective buildings and the need to ensure their structural integrity. This structural integrity works will include the following critical Operational Centres • Dublin ACC Building • Ballycasey Centre • Shannon Air Traffic Control Tower • Dublin Radar 2 Energy Centre This project will be delivered by competent 3rd party contractors following a full public procurement tender process and will be overseen by a 3rd party project management company. All works will be completed to building regulations and all material removed from site will be disposed of in an environmentally friendly manner.
Category	
RP3-Conditional Works	Dublin ACC Building, Ballycasey Centre, Shannon Air Traffic Control Tower and Dublin Radar 2 Energy Centre.
Primary Driver	Structural Requirements
Secondary Driver	Operational Efficiency / Service Delivery
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	- Supervision by IAA Engineering personnel - Internal resources for management, procurement & finance
Project Output	Completion of Structural Integrity Works at Key IAA Centres
Asset life	25 years

Key Information / Benefits

- Regulatory and Legal Compliance
- Compliance with International (ICAO), European (EU) and National (NCASP) regulations.
- Essential new and replacement works
- Energy Efficiency
- Liability Protection - Assurance that critical IAA Operational equipment is adequately protected from damage / interference due to the presence of appropriate security system
- Added Safety for the public - intrusion could result in severe harm or loss of life
- Added safety for staff / contractors and caretakers visiting remote locations
- Realtime information on local conditions always available
- Prescence of security system deters criminals
- Faster response times to incidents
- Records of incidents retained
- Ability to integrate with local security / alarms and protocol
- False Alarm reduction
- Ongoing investment reduces potential for issues to escalate to a major or emergency status
- Reliable and appropriate environment for Operational and Engineering ensuring that the IAA can deliver a service to meet customer expectations.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance

Dublin ACC Building Works

Project Summary

Dublin ACC Building Fabric Works and Fire Escape Installation

Project Details Summary	This project provides for the replacement of the end-of life rear building roof light, replacement of the dilapidating glass curtain wall and the installation of an external fire escape ladder from the existing air traffic control cab in the Dublin ACC building. This project will be delivered by competent 3rd party contractors following a full public procurement tender process and will be overseen by a 3rd party project management company. All works will be completed to building regulations and all material removed from site will be disposed of in an environmentally friendly manner.
Category RP3-STRUCT- DUB - ACC	Dublin ACC Building
Secondary Driver	Operational Efficiency / Service Delivery
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been advised by the IAA's contracted Quantity Surveyors via a Framework Agreement
OPEX Impacts	- Supervision by IAA Engineering personnel - Internal resources for management, procurement & finance
Project Output	- Provision of appropriate building fabric which is weatherproof and protects the integrity of the building. Installation of an external fire escape ladder from the air traffic control tower cab
Asset life	15 years

Key Information / Benefits

- Regulatory and Legal Compliance
- Essential new and replacement works
- Energy Efficiency improvements
- Assurance that critical IAA Operational equipment is protected from damage due to deterioration of the buildings
- Assurance that all works are completed by competent contractors providing conditionally sound buildings which will sustain for an estimated 15-year life for all upgrades
- Prolong the longevity of the buildings and their contents
- Ongoing investment reduces potential for issues to escalate to a major or emergency status
- Reliable and appropriate environment for Operational and Engineering ensuring that the IAA can deliver a service to meet customer expectations.
- Staff / Contractors – improved and safer facility
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance

Energy Management Upgrade Works

Project Summary

Energy Management Upgrade Works Across IAA Centres

Project Details Summary

The Property and Security Unit have been assigned responsibility for the review of energy efficiency and spend throughout the IAA and to introduce practical cost-effective initiatives and programmes. The context of these energy initiatives and programmes is that under SI 426 of 2014, public bodies (including the IAA) are obliged to support the Government's target of a 33% energy reduction in energy usage.

The collation and analysis of energy data from 2014 to 2018 has been conducted and enabled the identification of 'quick win' energy initiatives during this period coupled with the negotiation of a discount, with ✂ and a further discount ✂ to Ballycasey. The quick wins implemented and negotiated contract discounts have accounted for a ✂ cost saving to date and included:

- The conduction of energy audits and the introduction of an energy tracking system
- Provision of energy awareness sessions at both HQ and Ballycasey
- Building management system controls and strategies
- Improved air handling, heating and lighting timing controls
- Replacement of end of life equipment with low energy LED lights and water heaters
- Adjustments to air handling variable speed drives to ensure optimum efficiency (heating and cooling controls)
- Other locally identified cost-effective practical energy saving initiatives

These 'quick wins' have resulted in a reduction of the IAA's energy usage since their implementation. However, the IAA has significant challenges in order to meet its obligatory target due to the planned introduction of new Centres/facilities, which will increase the IAA's energy usage by up to 20%, these include:

- CEROC (Contingency) Centre
- New remote radar sites
- New Visual Control Tower Dublin

✂ was appointed to conduct detailed energy audits of each of the IAA existing main Centres and provide comprehensive reports. These detailed reports included recommendations of energy upgrade works, which would ensure the IAA's compliance with our obligation to deliver a 33% energy reduction, ensure our buildings are energy efficient and provide energy cost savings to the IAA.

The Property & Security Unit conducted a detailed assessment of the reports and the recommendations and following this, a costing exercise was conducted for the identified optimum energy upgrade works across the main Centres and high- energy usage sites. These recommendations and costing were presented to the IAA Executive Group and Senior Management Group during

2018 for endorsement, which was received.

Category	
RP3-PLANT	Energy Upgrade Works
Primary Driver	Regulatory Requirement
Secondary Driver(s)	Operational Safety
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costings provided by ✂, based on the specification of requirements provided by ✂.
OPEX Impacts	Supervision by IAA Engineering personnel Service contract via IAA FM contracted service
Project Output	Energy Upgrade Works at IAA Centres
Asset life	<10 years

Key Information / Benefits

- Regulatory and Legal Compliance.
- Essential new and replacement works.
- Energy Efficiency.
- Assurance that all works are completed by competent contractors providing conditionally sound buildings which will sustain for an estimated 10–15-year life for all upgrades.
- Ongoing investment reduces potential for issues to escalate to a major or emergency status.
- Staff / Contractors – improved facility.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance.

Replacement of Building and Equipment Cooling System

Project Summary

Replacement of Building and Equipment Cooling System – Dublin ACC

Project Details Summary	In 2015, a conditional survey at Dublin ACC by an independent 3rd party identified that the three internal and two external air-handling units at Dublin ACC had passed their end of life and required replacement and reconditioning. It reported that the external pipework was leaking and required replacement and recommended that the internal pipework should also be replaced at the time of replacing and reconditioning the air-handling units. ✂. In late 2018, an emergency budget was obtained of ✂ to replace the external pipework from the chiller units to the main building connecting to the internal air-handling pipework. New internal pipework will be installed adjacent to the existing internal pipework so as not to disrupt the operation of the units. The two-external air-handling units can be replaced due to their location but the other three units are housed internally within the building in the plant room and the only feasible option is for the complete reconditioning of these units in-situ. This will involve the complete replacement of all mechanical and electrical components of the units to essentially provide three new internal units. It will be necessary to change out the associated water tanks servicing the current air-handling units as part of this project. Temporary external mobile air-handling units will need to be installed during the works to ensure that there is no interruption to the service coupled with internal mobile units to supplement during the downtime of each individual unit as it is completely reconditioned. The works will involve the passing through of external and internal walls, ceilings and compartments and the budget provides for associated civil, remedial and fire-stopping reinstatement works.
Category	
RP3-CONDITIONAL-DUB ACC	Replacement of Building and Equipment Cooling Systems

Primary Driver	Regulatory Requirement
Secondary Driver(s)	Operational Safety
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costings provided by ✂.
OPEX Impacts	Supervision by IAA Engineering personnel Service contract via IAA FM contracted service
Project Output	Building and Equipment Cooling System at Dublin ACC
Asset life	10-15 years

Key Information / Benefits

- Regulatory and Legal Compliance.
- Essential new and replacement works.
- Energy Efficiency.
- Assurance that all works are completed by competent contractors which will sustain for an estimated 10–15-year life for all upgrades.
- Ongoing investment reduces potential for issues to escalate to a major or emergency status.
- Staff / Contractors – improved facility.
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance.

Temperature Checking Equipment

Project Summary

Temperature Checking Equipment – All Main Centre

Project Details Summary	The scope of the project is for the provision of appropriate fixed automated temperature checking cameras and associated systems into each IAA Centre at the relevant points of access. These fixed units will check the temperature automatically of all staff, visitors and contractors who transit via the access points and will alert via related software to the security desk. With the current COVID19 pandemic it is essential that the IAA provides appropriate protective and preventative measures. The identification of one of the key symptoms of COVID19 (high temperature above 38 degrees) for all those who are accessing IAA Centres supports the IAA in achieving its obligations.
Category	
RP3-H&S	Temperature Checking Equipment
Primary Driver	Regulatory Requirement
Secondary Driver(s)	Operational Safety
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costings provided by ✂, based on the specification of requirements provided by ✂.
OPEX Impacts	Supervision by IAA Engineering personnel Service contract via IAA FM contracted service
Project Output	Temperature Checking Equipment
Asset life	<10 years

Key Information / Benefits

- Regulatory and Safety Compliance
- Protection of Staff, Visitors and Contractors
- Early warning of high temperatures and potential positive COVID 19 cases
- Protection against a reduced workforce due to transmission of COVID19 or loss of staff days due to potential close contacts

Climate Action Plan (Sustainability Management Plan)

Project Summary

Climate Action Plan – Companywide Sustainability Management Plan

Project Details Summary

To achieve the IAA's aim is to become carbon neutral in their use of energy and decrease their impact on the natural world by enhancing the sustainability of their business.

Carbon Neutral Plan (Electricity Use)

- eliminate the majority of fossil fuel used across the business
- invest in energy efficiency and generate the balance of energy used from renewable resources
- continued electrification of heat (has commenced already)
- transferring power, through an electricity supplier, on a net annual basis to its portfolio of facilities.

Carbon Neutral Plan (Carbon Dioxide Emissions)

- Cut carbon dioxide to near zero by 2050 and a minimum of 50% by 2030 through development of a zero-carbon investment strategy
- Transition IAA vehicles to battery electric vehicles and charging infrastructure as part of an overall transport energy reduction strategy

The following measures amongst others will be implemented to achieve the IAA's objectives

- Energy efficiency investments in lighting, insulation, windows and doors.
- Replacement of older split air-conditioning systems with new centralised air-conditioning systems with heat recovery.
- Replacement of air handling units with heat pump-based systems.
- Converting radiator systems to heat pump-based systems.
- Installation of Solar PV or Wind Generation*
- Implement green procurements across the organisation
- EV Chargers - continue to roll out charging points, increasing the number as required based on an individual facility assessment.
- Implement biodiversity support and promotional activities

Self-Supply of Electricity
In conjunction with the electrification of transport and heating, the viability of renewable electricity improves for the organisation as a whole.

The exact mix of these technologies will be determined through detailed site by site technical analysis, taking cognisance of the following key challenges in operating navigational equipment and sites:

- Sensitivity to special areas of conservation (SAC) on IAA's landholdings.
- Potential for interference with radio and radar communications
- Glint, glare and impact on neighbours
- Erection of large equipment (radio masts) and the required land sterilisation (from installation of renewable energy)
- Restriction of access and use of particular sites.

The IAA will examine the potential of a corporate power purchase agreement to have a third-party construct, finance and manage PV array(s) on their behalf either on land owned or close to IAA Facilities

In the event of there not being sufficient space available for the overall generation, the potential of leasing adjacent agricultural land to construct solar generation facilities may be considered. This method was employed in Belfast airport.

The scope of the project includes for the provision of appropriate E-charging units and associated works at Ballycasey ATC, Ballygirreen NAC / CEROC and Cork ATC facilities. Additional carparking spaces will be required at Ballycasey to facilitate the installations.

Category	
RP3-	Climate Action Plan (Sustainability Management Plan)
Primary Driver	Regulatory Requirement
Secondary Driver(s)	Operational Safety
Total Capex Requirement	€5million

Assumptions/Cost Benchmarks	The estimated cost for implementation of a Climate Action Plan to achieve the required outcomes is €5million
OPEX Impacts	Supervision by IAA Engineering personnel Service contract via IAA FM contracted service
Project Output	Climate Action Plan (Sustainability Management Plan)
Asset life	10-20 years

Key Information / Benefits

- Regulatory and Legal Compliance
- Protection of the Environment
- Promotion of electric transport
- Enhanced facilities for Staff
- Reduction in the use of fossil fuels
- Reduced CO2 emissions
- Reduced toxic fumes.

Essential Building Upgrade Works at Mt. Gabriel

Project Summary

Essential Building Upgrade Works at Mt. Gabriel Radar Station

Project Details Summary

The scope of the project is essential upgrades of the existing building structure, finishes, lighting, emergency lighting, fire safety and essential external siteworks as follows:

Buildings 1 and 2

- Removal and replacement of damaged / end of life finishes
- Structural upgrades to existing concrete slabs and soffits of dome collar overhang
- Structural upgrades to existing window and door heads
- Replacement of damaged / end of life internal doors to include fire rated and non-fire rated as necessary.
- Internal Decoration to areas disturbed
- Remove existing fall arrest system to dome collar and flat roof and replace with a new appropriate and safe solution
- Structural upgrades to existing asphalt to dome bases.
- Structural brickwork upgrades
- Replacement of flashings
- Fire System installations in line with regulatory requirements
- Replacement of the existing roof finish to the Radome perimeter collar
- New roof finish to the lower flat roof (1 building only).
- External drainage replacements and upgrades
- Replacement of Radome access ladder for a safe and appropriate solution
- Structural upgrades to concrete cracks and spalling to external walls
- Replacement of existing sealant to external wall vertical joints and reseal with new.
- Replacement of appropriate and emergency lights and heating systems.
- New water tank and replacement/upgrades to damaged cable trays externally.
- Entrance gates and supporting steelwork upgrades
- Installation of new Lighting to internal path/road between the buildings
- Replacement / Upgrades of existing perimeter footpath.

The works are essential to ensure the building performs to an acceptable standard.

Category	
RP3-CONDITIONAL	Essential Building Upgrade Works at Mt. Gabriel Radar Station
Primary Driver	Regulatory Requirement
Secondary Driver(s)	Operational Safety
Total Capex Requirement	€✂

Assumptions/Cost Benchmarks	Costings provided by ✂, based on the specification of requirements.
OPEX Impacts	Supervision by IAA Engineering personnel Service contract via IAA FM contracted service
Project Output	Essential Building Works at Mt. Gabriel
Asset life	15 years

Key Information / Benefits

- Regulatory and Legal Compliance
- Essential new and replacement works
- Energy Efficiency
- Assurance that critical IAA Operational equipment is protected from damage due to deterioration of the buildings
- Prolong the longevity of the buildings and their contents
- Ongoing investment reduces potential for issues to escalate to a major or emergency status
- Reliable and appropriate environment for Operational and Engineering ensuring that the IAA can deliver a service to meet customer expectations.
- Staff / Contractors – improved and safer facility
- Better value for money achieved by planned expenditure as opposed to reactionary repairs / maintenance

Appendix 2 ICT Project Sheet

2022-2024 ICT Infrastructure Life Cycle Management and Compliance

Project Summary

Information Communication Technology (ICT) – Various

Project Details Summary	ICT aims to ensure that the IAA has access to the necessary ICT infrastructure to deliver the required ICT services. The current environment is hybrid in nature, combining on premise and Cloud based services/servers. There has been a dynamic growth in computing power, storage, resilience requirements and effort to implement and maintain the infrastructure. With the introduction of new Private Cloud environments as well as Public Cloud computing continuing to grow, the resource demands continue to increase to match the business needs. There has been a significant increase in the volume of data being stored over the course of the last 8 years; it has grown over 300-fold and over the last 2 years alone, it grew over 100%. This is indicative of the expansion in the range and scope of ICT systems. The infrastructure is becoming increasingly complex and interdependent, as the technology is developing and changing at a rapid rate. The life cycle management of the infrastructure and the cybersecurity compliance (NIST CSF framework) are key to ensuring business continuity. This project will be delivered partnership with competent 3rd party vendors following full procurement tender processes and will be project managed directly by ICT staff. All project works will factor in cybersecurity compliance, recycling procedures and are subject to annual security audits.
Category	
RP3-Plant	ICT Projects – Life Cycle Management & Compliance
Primary Driver	Life Cycle Requirements
Secondary Driver	Cybersecurity Compliance
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	✂
OPEX Impacts	✂
Project Output	✂
Asset life	3-5 years
Project Delivery Key Milestones	Project delivery: 2022-2024

Key Information / Benefits

- Ensures the infrastructure life cycle management – 'in life' vendor support
- Cybersecurity risk mitigation and compliance for IT Business Network
- Safe, secure and resilient IT Business Services
- Business Continuity
- Ensures manufactures support/maintenance
- Prevents risks to customers by loss of ICT services – foundations hosting the Business Applications
- Enabling the Digital Workplace – process automation
- In-direct ICT costs for projects are factored into their own streams (e.g. Facilities Fit-outs, Restructuring/Separation)
- Separation Project is being managed by the Regulator and they have informed ICT that they are compiling the budget costs.

Appendix 3 Technology and Operations Project Sheets

Network and Security Projects

Edison Core & Security

Project Summary

The contingency project of CE-ROC delivered the first IAA Operational IP Network Service. This project will build on the IP Network to provide Core Connectivity to our ATC Centres in Ballycasey and Dublin and facilitate the investment required to enable migration from legacy TDM Backbone system.

Project Details Summary	The objective of the project is to facilitate the second phase of the migration of the IAA backbone network to a fully IP enabled platform. Under phase 1 Ballygirreen Contingency Building (Contingency En-route & Operational Centre - CE-ROC) project, the IAA connected CE-ROC and the remote VHF Comms / Radar sites to an IP based resilient access platform. This second phase facilitates provision of a high-speed network on the core layer that connects our main Operational Centres to enable the provision of ATM Services and supports expansion of NOKIA IP Network services to New Dublin Tower, Dublin Radar, Cork Radar.
Category	RP3- Technology Regulatory
Primary Driver	Obsolescence
Secondary Driver	Safety
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using Framework pricing leveraged under Project Q007 and associated Tender for the acquisition of IP Network equipment to support CNS ATM systems
Project Output	Resilient, Cost Effective, Scalable Core Network
Asset life	8 years

Project Delivery Key Milestones
Phase 2 – Dublin NTPR • Factory Acceptance (LAB) – Nov 2019 • Site Acceptance – March 2020 • Safety Case Approval – April 2021 • Operational-Date – Aug 2021 Phase 2A – Ballycasey Core • Factory Acceptance (LAB) – March 2021 • Site Change Approval – June 2021 • Safety Approval – Q3 2022

LEVEL 1 - Cost Analysis	Represents % of total	Total
EDISON CORE	✂	✂
Fibre Networks & Installation works in Dublin.	✂	✂
NOKIA Phase 2 Network	✂	✂
Safety Support & Technical Consultancy	✂	✂
Total	✂	✂

Key Information / Benefits

- Safety
  - Existing Core Connectivity is provided on Backbone Equipment, which is End Of Life, presenting a risk to system safety.
- Obsolescence addressed
  - Supports the migration of Backbone Connectivity between CORE Sites

IP Network Rollout

Project Summary

Procure and install new IP Hybrid Multiplexers which will carry all the IAA's current legacy data and voice feeds along with new IP services such as Remote Tower and Centralised Monitoring in order to allow for all future service requirements.

Project Details Summary	Air Traffic Control services are dependent on the continuous (diverse) connections to IAA remote radar and Communications sites to provide Radar data and Voice Communications to the Controller Working Positions. This radar and voice data is carried over third party telecommunications lines which are connected to the IAA Backbone Network Multiplexers at each end. The IAA Backbone Network Multiplexers allow multiple data feeds to be multiplexed together and feed down the same telecommunications lines. These IAA Backbone Network Multiplexers are end of life and cannot carry new IP services for ADS-B, IP Radar feeds, Voice over IP (VoIP), data feeds leading to a requirement for a replacement IP Network System to replace the legacy Backbone System.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current hardware equipment costs from IP Hybrid Multiplexer suppliers.
OPEX Impacts	✂
Project Output	The project will facilitate the migration of the IAA backbone network to a fully IP enabled backbone network that can accommodate the connectivity of all current and future IAA services and technology requirements. The IAA's Backbone Network infrastructure enables the connectivity between remote site radar data and VHF voice communications back to the Controller Working Positions at the Air Traffic Control Centre's (ATCC). With CNS technology and services moving to IP, the IAA must migrate its backbone network infrastructure to an IP network capable of supporting connectivity for current ATC services (Air/Ground voice and radar =data) as well as new services being rolled out in the IAA (Remote Towers, ADSB, Centralised Monitoring, CEROCIP connectivity, Virtual Centre's, SWIM)
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
• Tender contract & vendor selection	Q2 2018
• Installation	Q1 2019
• Commissioning	Q2 2019
• Testing	Q2 2019
• Regulatory approval	Q3 2020
• Training	Q2 2020
• Deployment	Q4 2020

Deliverables

The procurement and installation of new IP

- Hybrid Multiplexers to cover all IAA remote Radar and Communications sites to allow for IP connectivity to Ballygirreen Contingency, Ballycasey and Dublin as well as legacy connectivity to Ballycasey and Dublin.
- Hybrid Multiplexers to connect all the IAA core ATC Centres for current data sharing (AMHS, FMTP) and future data services (SWIM) as well as providing a dual core redundant ring between the IAA core ATCC's for system wide redundancy.
- Provide IP connectivity to the PENS network as well as other international Networks connectivity (ERIN, NANU, SIRP 2).

Key Information / Benefits

Safety

- The existing Network Multiplexers are end of life and support will diminish over the forthcoming years from the supplier for this backbone network equipment. Telecom providers are also moving away from the traditional TDM market to IP networks meaning current IAA backbone equipment will become obsolete and possibly unable to provide connectivity from Radar and Communications sites to ATC CWPs.
- Procuring and installing new IP Hybrid multiplexers will ensure safety is not compromised as support will remain in place for new IP Hybrid multiplexers for the lifetime of the multiplexers (15+ years) and the IAA will have migrated to a full IP network before the Telecom providers cease their existing leased line networks.

Efficiency

- The IAA Backbone Network Multiplexers allow multiple voice and data feeds to be multiplexed together and feed down the same telecommunications lines. This provides savings to the IAA in terms of reduced line rental to third party telecommunication companies

Customer Needs

- This project will enable additional IP services to be added at remote Radar sites, VHF Communication sites and ATCC sites as well as ensuring the continued availability and reliability of the IAA's Backbone Network infrastructure.
- Supports roll out of new IP services e.g. Remote Towers, ADS-B, Centralised Monitoring, Ballygirreen Contingency IP connectivity, Virtual Centres, SWIM.

Removal of obsolescence risk

- The reliability of the Backbone Network infrastructure may be compromised as it is end of life and support will diminish over the forthcoming years from the supplier for this backbone network equipment.

Upgrades to Cable Ducting at Remote Sites

Project Summary

The cable ducting at the IAA remote sites was installed in the 1960's and requires replacement. The IAA is building out a fibre network to the remote sites and the current ducting in situ cannot support these fibre rollouts.

Project Details Summary	The provision of safe and efficient ATC services is dependent on the continuous (diverse) connections to the remote radar and Communications sites to provide Radar data and Voice Communications to the Controller Working Positions. This radar and voice data is carried over third party telecommunications lines, which are connected to the IAA Backbone Network Multiplexers at each end. The third-party telecommunications lines are provided using a terrestrial copper line or a microwave radio link. The scope of this project is to cover the necessary CAPEX costs, to repair existing ducting where possible and to install new ducting at IAA sites to allow for the dual diverse fibre rollout for the IAA's new IP Gigabit Ethernet Backbone network. This backbone network will carry all the IAA's current legacy data and voice feeds along with new IP services such as Remote Tower and Centralised Monitoring in order to allow for all future service requirementsCE.
Category	RP3- Technology Terminal & En-route ATC service
Primary Driver	Safety
Secondary Driver	Removal of obsolete infrastructure
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current quotations from civil contractors. The internal manpower costs are based on known system installation, commissioning and engineering training and documentation preparation time scales
OPEX Impacts	None
Project Output providing Network and	Repairing and installing new cable ducting will facilitate the new IAA Core Network to an Ethernet based Core resilient connectivity between ATC Centres and the Contingency Site. The project will also address the provision of stable Connectivity between key sites through provision of Duct Fibre to support key ATC services such as CNS Voice and Radar data at Woodcock Hill.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
• Installation Remote Sites	Q2 2020
• Installation Core	Q2 2021
• Commissioning	Q3 2021
• Testing	Q3 2021

Deliverables

- The repair and installation of cable ducting at IAA remote sites to allow the fibre rollout to continue to proceed enabling the rollout of the new IAA IP backbone network
- The installation of new diverse ducting at, Ballycasey and Shannon Tower to provide two diverse fibre terrestrial routes to all IAA core sites for the rollout of a new dual diverse Gigabit Ethernet Backbone network.

Sites in scope

- New Ducting at Woodcock Hill to link Receiver site to Transmitter site
- New Ducting for Ballygirreen (CE-ROC)
- New dual diverse ducting for Ballycasey to link to Caherdavin
- New ducting for Dooncarton IAA site
- New dual diverse ducting for Shannon Tower
- Repair to ducting at Mt. Gabriel

Key Information / Benefits

Business Continuity/Risk avoidance

- Attempting to re-use existing ducts is not an option as there is an extreme probability and risk to existing services if these ducts are accessed for new cables.
- Cable ducts were installed in the 1960's and are no longer viable to carry new cables.
- New Fibre Core will support the distribution of inter-site services and deliver resilient connectivity to the IAA Contingency Centre.

ERIN TDM-IP Network Migration Project

Project Summary

The announcement in January 2021 by Vodafone of their intention to retire E1 product services from their portfolio with effect from July 2021 requires IAA & NATS to design and implement an alternative solution to the existing ERIN network provided by Vodafone and which enables communications, surveillance and FDPS connectivity between the two ANSPs.

Project Details Summary	The ERIN Network between IAA & NATS provides international connectivity between the UK and the Republic of Ireland. This consists of 3 x Circuits known as RED1 E1, GREEN1 E1 and GREEN2 E1. ERIN Network Circuits carry mission Critical Operational Services such as: • Comms: MFC Comms Lines to NATS & Brest; Iberian Frequency Prestwick • SUR: Data feeds including TIREE Radar • FDPS: FMTP/AMHS & ROFDS services ERIN E1 Circuits are based on legacy technology but provide seamless and secure interfaces to the "National Backbone Networks" of both IAA and NATS for distribution of these services to our Air Traffic Control functions. Vodafone UK announced in January 2021, their intention to remove "E1" services from their operation with effect from July 2021. IAA and NATS are engaged with Vodafone to seek an extension of this End of Life for our critical transport services. Such additional time will allow IAA and NATS to acquire test the solution, seek safety approval, and implement a future-proofed solution based on IP Network Technology. .
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Business Continuity
Secondary Driver	Safety
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been constructed using estimates based on recent experience of network connectivity solutions
OPEX Impacts	✂
Project Output	New data network providing business continuity. Continued connectivity between IAA & NATS Resiliency for PENS network connectivity
Asset life	8 years

Project Delivery Key Milestones	
Milestone	Completion Date
• Acquire equipment to enable proof of concept and operational solution	Q3 2021
• Test Phase start / end	Q4 2021
• Secure safety approval	Q3 2022
• Full Implementation	Q1 2023

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
• Test Equipment	✂	✂
• Operational equipment		
• Design & Technical Services		
• Safety Consultancy		
Total	✂	✂

Key Information / Benefits

- For both IAA and NATS a key requirement is agreeing a per service migration plan to safely test and migrate services to ERIN IP Network.
- Business continuity retained.
- Safety not compromised.

System Resilience NIS Compliance NIS Directive

Project Summary

EASA will introduce regulation during 2022 to mandate ANSP's to comply with Cyber Security in ATM Systems. The scope to be defined will introduce more onerous requirements on ANSP's to develop their Information Security Management Systems internationally recognised standards and increase Audit focus will drive requirements for further enhancements of Detect, Protect, Respond and Recover capability.

Project Details Summary	The NIS Directive (EU) 2016/1148 was formally transposed into Irish legislation under the European Union (Measures for a high common level of security of network and information systems) in September 2018. The scope to be defined will introduce more onerous requirements on ANSP's to develop their Information Security Management Systems internationally recognised standards and increase Audit focus will drive requirements for further enhancements of Detect, Protect, Respond, Recover capability. This will require further investments in segmented systems, networks, equipment. The precise detail with be outlined with the publication of new EASA Regulation – RMT0.720.
Category	RP3- Technology Regulatory
Primary Driver	Resilience & Security
Secondary Driver	Regulatory Compliance
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on estimated IAA estimation methods for purchase and installation of ATM systems.
OPEX Impacts	✂
Project Output	Enhanced Security Cyber Resilience, Additional Network & Equipment Segmentation of critical ATM Systems
Asset life	8 years

Project Delivery Key Milestones

✂

Phase 2 – Network Enhancements

- Additional Network Segregation – Equipment and Services Q4 2023
- Additional Network Resilience – Design and PS Q1 2025

LEVEL 1 - Cost Analysis	**Represents % of total.**	**Total**
Corrective Action Project 1 – ENG Sec Management System Q2 2023	✂	✂
Corrective Action Project 2 – Security Monitoring OPS Solution Q4 2023	✂	✂
Additional Network Segregation – Equipment and Services Q4 2023	✂	✂
Additional Network Resilience – Design and PS Q4 2023	✂	✂
Total	✂	✂

Key Information / Benefits

- NIS Compliant
- Business continuity assurance
- Compliance with safety & regulatory requirements

CYBERSECURITY NIS Directive

Project Summary

The NIS programme requires that we develop and grow our existing capability around ATM System Identification and Protection, whilst delivering a capability to Detect, Respond and Recover our system in the event of a Cyber Event / Cyber Attack.

Project Details Summary	The NIS Directive (EU) 2016/1148 was formally transposed into Irish legislation under the European Union (Measures for a high common level of security of network and information systems) in September 2018. The Irish Aviation Authority (ANSP) has been identified under the legislation as an Operator of Essential Services and is mandated by the national competent authority (National Cyber Security Centre, NCSC) to comply with the obligations of the Security of Network Information Systems (NIS) directive. This project provides the investment support for ATM ANS Cyber Lab for security testing and Security Incident Event Manager (SIEM) to support enhanced detection and meet our compliance requirements.
Category	RP3- Technology Regulatory
Primary Driver	Safety & Security
Secondary Driver	Regulatory Compliance
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on estimated IAA estimation methods for purchase and installation of ATM systems
OPEX Impacts	✂
Project Output	NIS Compliance, Enhanced Security Monitoring & Detection of critical ATM Systems
Asset life	8 years

✂

Key Information / Benefits

- NIS Compliant
- Business continuity assurance
- Compliance with safety & regulatory requirements

Flight Data Processing / Communications Projects

Test Equipment for Navigational Aid Systems

Project Summary

Purchase new test equipment (EDS300) and replace old test equipment used in the maintenance of Navaids.

Project Details Summary	Instrument Landing Systems (ILS) and other Navaids are vital to the provision of safe and efficient En-Route and terminal ATC services. It is essential that they are maintained to the appropriate ICAO standards and manufacturers recommendations. The existing Navaids test equipment has been in service for over 20 years and needs to be replaced at all three state airports. Provision is also included for additional test kits for DME systems, one test kit was procured, and additional further test kits are required for each of the airports.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs are based on current quotations from relevant industry contractors.
OPEX Impacts	None
Project Output	Purchase of new test equipment (EDS300) to replace old test equipment used in the maintenance of Navaids. Provide modern and reliable test equipment to operational engineers to complete their planned and unplanned maintenance in a timely manner.
Asset life	8 years

Project Delivery Key Milestones	
Milestone	Completion date
• Tender contract & vendor selection	2018
• Purchase Equipment	2019 / 2020
• Operational use of equipment	2020 / 2021

Deliverables

Purchase the following test equipment

- ✂. DME/Pulse Analyzers
- Navaid test set signal generators
- Vector Voltmeter
- Power meter and sensors
- Oscilloscopes
- Directional couplers

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
2 x ✂ DME/Pulse Analyser	✂	✂
1 x VVM for Cork	✂	✂
3 x Power meter	✂	✂
3 x Power meter Sensor	✂	✂
3 x Oscilloscope	✂	✂
3 x Directional coupler	✂	✂
3 x Signal Generator	✂	✂
Total	✂	✂

Key Information / Benefits

- Modern reliable test equipment used to maintain Navaids equipment to ICAO standards.
- Efficiency: New reliable test equipment will reduce planned and unplanned maintenance times.
- Reduce the risk of delayed restoration of Navaids and thus avoiding potential delays to airlines.

PABX Infrastructure Upgrade Ballycasey

Project Summary

This project will replace the existing Ballycasey Centre PABX with a new system and install a Software and Firmware upgrade on the Cork Tower PABX

Project Details Summary	The provision of safe and efficient ATC services is dependent on voice connectivity between Air Traffic Control Centres (ATCCs) nationally to Airports and ATCCs and internationally to other ANSPs and third parties. ATC Ground-Ground voice connectivity is routed through the ATC Voice Communications Switch (VCS), which is connected to the Public Switched Telephone Network (PSTN) using PABXs (Private Automatic Branch Exchanges) located at the IAA's ATCCs. These PABXs are located at Ballycasey, Dublin Control Tower, Ballygirreen and Cork Control Tower. ✂The Ballycasey PABX was installed in 2003 and has reached End of Life (EOL) status with the supplier meaning IAA can no longer access spare parts and software upgrades. It is currently supported by the supplier, ✂ but only on a best endeavour basis. The Cork PABX was installed in 2008 and is currently still manufactured and supported by ✂ however it requires a Firmware and Software upgrade to extend its useful life and enable the supplier to provide extended support.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence & Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs are based on current quotations from PABX supplier, ✂
OPEX Impacts	Reduced maintenance contract costs due to new and upgraded PABXs.
Project Output	The installation of a new PABX at IAA Ballycasey ATCC will allow continued voice connectivity between IAA Ballycasey ATCC and other adjacent ATCCs and Airports. The upgrade of the existing PABX at IAA Cork Tower will allow continued voice connectivity between Cork Tower and other adjacent ATCC's and Airports
Asset life	8 years

Project Delivery Key Milestones	
Milestone	Completion date
• Procurement & Design	2021
• Installation and Commissioning Ballycasey	2022
• Installation and Commissioning Cork	2023

Deliverables

The installation of a new PABX at IAA Ballycasey ATCC and upgrading of existing PABX at Cork Tower for providing voice connectivity services between IAA ATCC's and adjacent ATCCs and Airports for the safe and efficient provision of ATC services.

LEVEL 1 - Cost Analysis – Site/Year	Represents	Total
Ballycasey PABX hardware and software and associated installation costs	✂	✂
Cork Tower PABX software/firmware upgrade and associated installation costs	✂	✂
Total	✂	✂

Key Information / Benefits

- Replacement and upgrade of ageing PABX infrastructure
- Continued voice connectivity between IAA Ballycasey ATCC, Cork Tower and other adjacent ATCCs and Airports.
- To allow additional services to be utilised for the IAA's VCS GND-GND voice connectivity including VoIP.
- To increase system redundancy with the new PABX providing Digital and Analogue backup trunk lines along with the onward connectivity of this PABX to the new CEROC Contingency Centre.
- For Cork Tower, this upgrade will extend the economic life of the PABX for a number of additional years and defer the requirement to replace this PABX in the short to medium term.

PABX Infrastructure Upgrade

Project Summary

This project will replace the existing Dublin Air Traffic Control Centre PABX with a new PABX.

Project Details Summary	The provision of safe and efficient Air Traffic Control (ATC) services is dependent on voice connectivity between Air Traffic Control Centres (ATCCs) nationally to Airports and ATCCs and internationally to other ANSPs and third parties. ATC Ground-Ground voice connectivity is routed through the ATC Voice Communications Switch (VCS), which is connected to the Public Switched Telephone Network (PSTN) using PABXs (Private Automatic Branch Exchanges) located at the IAA's ATCCs. These PABXs are located at Ballycasey, Dublin Control Tower, Ballygirreen and Cork Control Tower. ✂. The Dublin PABX was installed in 1993 and is now obsolete in terms of spare parts and software upgrades. It is currently supported by the supplier, ✂, but only on a best endeavour basis. An urgent requirement exists to replace this Dublin PABX.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence, Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs are based on current quotations from PABX supplier, ✂
OPEX Impacts	Reduced maintenance contract costs due to new PABX.
Dublin Airport will	**Project Output** The installation of a new PABX at IAA allow the continued safe voice connectivity between IAA Dublin Airport ATCC and other adjacent ATCCs and Airports and remove the risk associated with the obsolete PABX.
Asset life	12 years

Project Delivery Key Milestones	
Milestone	Completion date
• Procurement & Design	2019
• Installation and Commissioning	2020 / 2021

Deliverables

The installation of a new PABX at IAA Dublin Airport for providing voice connectivity services between IAA ATCC's and adjacent ATCCs and Airports for the safe and efficient provision of ATC services.

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Hardware	✂	✂
DECT System	✂	✂
Software	✂	✂
Total	✂	✂

Key Information / Benefits

- Replacement of ageing PABX infrastructure
- Continued voice connectivity between IAA Dublin Airport ATCC and other adjacent ATCCs and Airports.
- To allow additional services to be utilised for the IAA's VCS GND-GND voice connectivity including VoIP.
- To increase system redundancy with the new PABX providing Digital and Analogue backup trunk lines along with the possibility to connect this PABX to the new Dublin Control Tower.

Airfield Cabling Replacement

Project Summary

Upgrade of the Shannon, Dublin and Cork airfield cables that have been in service for over 40 years. Data for the IRVR and ILS RSI is transmitted on the existing airfield cables and a failure of these cables could result in the ILS or IRVR being unavailable which has the potential to close the runway depending on Category conditions at the time of failure.

Project Details Summary	Elements of the Shannon and Dublin airfield cables have been in service for over 40 years. Data for the IRVR and ILS RSI is transmitted on the existing airfield cables and a failure of these cables could result in the ILS or IRVR being unavailable. In poor visibility, the loss of IRVR or ILS could result in disruption to traffic. In Shannon, the airfield cables also connect the voice switch to the VHF receiver site. The existing airfield cabling at Shannon and Dublin Airport needs to be upgraded. The Cork airfield cabling was upgraded in 2008/2009 so a minor upgrade to the Cork cabling and equipment will add resilience. This project will ensure diversity on cable routes at Shannon and Dublin airport, which is currently lacking. Upgrade of the Shannon airfield cabling will facilitate diverse routing of the datacomms from the airfield via the control tower and Shann Radar (SRE) building to Ballycasey. This project will also facilitate a diverse route from the Shannon control Tower to Ballycasey via the SRE building. The scope of this investment is to: ▪ Install new ducts where required, (existing ducts will be used where available and as long as they are in good condition). ▪ Install fibre optic cables to sites on the airfield. ▪ Upgrade IRVR, ILS RSI and Comms equipment so it is compatible with fibre.
Category	**RP3- Technology** Operational Service Delivery
Primary Driver	Safety
Secondary Driver	Obsolescence, Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs estimates are based on current quotations from relevant industry contractors. The internal manpower costs are based on known system installation, commissioning and engineering training and documentation preparation time scales.
OPEX Impacts	✂
Project Output	The objective of this project is to replace existing airfield cabling and provide new diverse airfield cabling to ensure the IAA continue to provide a safe, reliable and cost-effective service to our users and customers.
Asset life	8 years

Project Delivery Key Milestones	
Milestone	Completion Date
Survey / repair existing ducts	2019
Install new ducts and associated civil works at Shannon airport:	2019 - 2021
Install new fibre cables at Shannon airport:	2021
Install new datacomms equipment at Shannon airport:	2021
Install new ducts and fibre to Shannon SRE site:	2022
Install new ducts and associated civil works at Dublin airport:	2021 / 2022
Install new fibre cables at Dublin airport:	2022-2023
Install new datacomms equipment at Dublin airport:	2023
Cork new ducts:	2021
Cork new cables:	2022
Install new datacomms equipment Cork:	2022

LEVEL 1 - Cost Analysis	✂	✂
Survey / repair existing ducts	✂	✂
Install new ducts and associated civil works at Shannon airport:	✂	✂
Install new fibre cables at Shannon airport:	✂	✂
Install new datacomms equipment at Shannon airport:	✂	✂
Install new ducts and fibre to Shannon SRE site:	✂	✂
Install new ducts and associated civil works at Dublin airport:	✂	✂
Install new fibre cables at Dublin airport:	✂	✂
Install new datacomms equipment at Dublin airport:	✂	✂
Cork new ducts:	✂	✂
Cork new cables:	✂	✂
Install new datacomms equipment Cork:	✂	✂
Total	✂	✂

Key Information / Benefits

The upgrade of airfield cabling will provide the following benefits:

- The existing airfield cabling has been in service for over 40 years and as time passes will be prone to failure. New fibre cables will ensure reliable datacomms for airfield equipment into the future.
- Where required new ducts will be installed protecting the cables and ensuring greater reliability.
- Installing fibre optic cables will future proof the airfield network.
- Fibre optic cables will provide additional capacity on airfield datacomms network for future equipment needs

Integrated Met Server

Project Summary

Upgrade of the existing METREP function in COOPANS with a system that is more cost effective and easier to maintain and replacement of the existing ATIS systems at Shannon Dublin and Cork with a system that is ICAO compliant, and more cost effective to maintain.

Project Details Summary	The provision of safe and efficient ATC services is dependent on the availability of accurate weather information. In particular in the approach phase, local airport weather information is critical, both for the controller to issue instructions and for the pilot. Currently in operations the provision of Local Airport Weather information is dependent on two systems. The Local METREP Window: This is a feature that is integrated into the COOPANS systems, and it displays the local weather information pertinent to the relevant airport. It is updated half hourly by the weather observer at the relevant airport. The weather observer has direct access to the COOPANS system, from a specific working position located at the Met Office in Shannon, Dublin and Cork Airports. The ATIS system, (Automatic Terminal Information Service) is an automated Terminal broadcast system that provides relevant weather and runway status to arriving aircraft. A Datalinked ATIS is also provided where the pilot can automatically up link the ATIS information to the aircraft FMS by datalink. As the METREP is integrated into COOPANS, it is proving very expensive to maintain and upgrade, as our other partners, implement local airport weather data by alternative means. The ATIS is also partially integrated in to the COOPANS systems and it uses messages for the AFTN to populate some of the ATIS data fields, this system is obsolete and can no longer be upgraded. The new EU-REG 373 relates to the provision of Meteorological services and currently there is an ANSD / ICAO non-compliance against the provision of MET services, in relation to the broadcast of runway status. This non-compliance is also applicable to Met Eireann as they are issuing a non-standard METAR message (Weather Message) to facilitate case of use for the ATIS. This is a joint project with MET Eireann. MET Eireann will provide the AMAP system which will encompass the new MET Sensors at each airfield and runway (Dublin, Cork and Shannon) and the IAA will provide the MDP (MET Data Processing) system to take the MET feeds into the IAA's ATC Centers and Towers. .
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence, Business Continuity
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Cost estimates are based on current quotations from relevant industry contractors. The internal manpower costs are based on known system installation, commissioning and engineering training and documentation preparation time scales.
OPEX Impacts	✂
Project Output	The Operations directorate and ATC Operations will be the beneficiary, Through improved Local Airport Weather information, and reduced costs as interfacing with automated weather systems will result in cost reductions from the current manual Met Observer interface with COOPANS. Improved display of additional ATC relevant data including Received Met Messages, Temporary Work Instructions, Weather RADAR. Improved ATIS system with increased levels of automation, and less manual intervention by the ATC Coordinator. Compliance with ICAO ANNEX 3 and EU 373 REG Met Requirements
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
• Tender vendor selection & contract	2018
• Dublin ACC & High Tower rollout	2021
• Cork Tower Roll Out	2022
• Shannon Tower Roll Out	2022
• Ballycasey Roll Out	2022
• CE-ROC roll out	2023

LEVEL 1 - Cost Analysis	✂	
Ballycasey and Shannon Tower MDP System	✂	
Dublin ACC and Tower MDP System	✂	
Cork Tower MDP System	✂	
ATIS systems for all Airports (Dub/ Cork / Shannon)	✂	
Network Costs	✂	
CE-ROC MDP System	✂	
Contingency	✂	
Total	✂	

Key Information / Benefits

- Through improved Local Airport Weather information, and reduced costs as interfacing with automated weather systems will result in cost reductions from the current manual Met Observer interface with COOPANS.
- In addition removal of the existing COOPANS connections to Met Eireann would simplify future software upgrades and maintenance activities.
- The IAA would be compliant with ICAO Met Requirements, and there would be less manual intervention required by the ATC Coordinator in preparing ATIS broadcasts.

Radio Frequency Interference Hunting Upgrade

Project Summary

The IAA must ensure the integrity of CNS systems and protect against unlawful interference of same. Procuring this radio frequency interference hunting upgrade will assist the IAA in expediently tracking the source of any unwanted interference with IAA CNS systems and ensure a quick resolution.

Project Details Summary	IAA must ensure the integrity of CNS systems and protect unlawful interference of same. Changes to the radio frequency environment such as mobile phone technology (5G) mean the potential for interference to IAA Core Navigation and Air traffic Control services is rising. In order to minimise business disruption, ✂ This upgrade will significantly enhance engineering capability to locate and resolve cases of radio frequency interference. This upgrade also provides the required evidence for engineering to report cases of radio interference to Comreg.
	.
Category	RP3- Technology Terminal & En
Primary Driver	Safety
Secondary Driver	Obsolescence
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	✂
OPEX Impacts	None
Project Output	Proposal provides necessary items to upgrade existing PR100 device with the capability to provide a mobile radio interference finding solution. Capability to quickly resolve interference issues. Ability to provide evidence of interference when required to escalate to COMREG
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Procure equipment	Q2 2021
Training Completed	Q3 2021

Deliverables

Upgrade existing PR100 device with the capability to provide a mobile radio interference finding solution.

Level 1 Cost Analysis

Cost Analysis	✂	✂
Hardware upgrade	✂	✂
Software upgrade	✂	✂
	✂	✂
Total	✂	✂

Migration of FMTP from IPv4 to IPv6

Project Summary

The IAA and all other European air navigation service providers (ANSPs) exchange flight plan data and flight plan updates electronically between their respective data processing systems. The protocol is called Flight Management Transfer Protocol (FMTP) and it is currently based on the common Internet Protocol IPv4. All ANSPs are mandated to implement FMTP based on the new IPv6 Protocol.

Project Details Summary	This project provides for enhancements to the existing COOPANS and IAA networks in order to facilitate the migration from IPv4 to IPv6. FMTP (Flight Management Transfer Protocol) FMPTP is based on internet protocol (IP) and is used for the distribution and sharing of flight plans and coordination data between adjacent ANSP's. IPv4 and IPv6 are versions of IP. IPv6 is an evolution of the widely deployed IPv4 and offers increased addressing options, improved management of real time data services and enhanced security.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated based on open market equipment costs.
OPEX Impacts	✂
Project Output	To replace old IPv4 hardware with equipment compatible with IPv4 to IPv6 conversion. To commission the new hardware without impacting the existing FMTP IPv4 connection in Shannon, Dublin and CEROC.
Asset life	8 years

Project Delivery Key Milestones	Date
Specification and hardware purchase	**Q1 2021 and Q2 2021**
Completion of wiring installations	**Q3 2021**
Complete validation and Safety Assessment	**Q3 2021**
Phased Transition Plan and Cutover.	**Q4 2021**

Deliverables

- NAT 64 Firewall and computer equipment
- Routers
- Installation of all cabling
- The decommissioning and removal of the existing hardware.
- A minimum of 12 months parts and labour warranty.

LEVEL 1 - Cost Analysis	✂	✂
Software & Hardware	✂	✂
Cabling	✂	✂
Contingency	✂	✂
Total	✂	✂

Key Information / Benefits

- The IAA is legally obliged by IR Regulation (EU) No 283/2011 amending Regulation (EC) No 633/2007 (flight message transfer protocol) to move to IPv6.
- The new hardware will be more resilient and reliable,
- The new hardware will be more powerful.
- Spares for the new equipment will be readily available to ensure continuity of service.
- Increased Security capabilities

Upgrades & Contingency IAA NET

Project Summary

The IAA-NET is an internal IP network for internal/external distribution of operational data. It is critical to ATM operations. The network has been in service for a number of years and the routers switches and firewalls are now obsolete.

Project Details Summary	The scope of this investment is the replacement of the hardware and the associated software in the routers, switches, firewalls and network monitoring workstations. The IAA-NET equipment is located in the following IAA sites Dublin ATCC, Ballycasey ATCC, Cork Tower, and CEROC. In addition, a separate contingency/test facility is required that will improve the IAA's resilience and allow for a fuller evaluation of software patches prior to their introduction on the operational platform.
Category	RP3- Technology Business continuity
Primary Driver	Business continuity
Secondary Driver	Safety
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated based on open market equipment costs.
OPEX Impacts	✂
Project Output	Obsolesce: The replacement of old network equipment so as to ensure the continuity of the service provision. Security: The new network operating systems will have the latest security protocols. Contingency: The importance of the network has grown over the years and it is now prudent to add a contingency network.
Asset life	8 years

Project Delivery Key Milestones	DATES
Specification and hardware purchase	Q1 and Q2 2021
Completion of wiring installations	Q3 2021
Complete validation and Safety Assessment	Q3/4 2021
Phased Transition Plan and Cutover.	Q1/4 2022
Capitalise	Q4 2022

Deliverables

The project will be implemented on a phased basis through successive software deliveries. A schedule will be agreed with the system supplier. The key milestones that will be established for each software build will be as follows.

- New network equipment (Routers, Switches and some firewalls)
- Installation and cabling
- The decommissioning and removal of the existing hardware.
- A minimum of 12 months parts and labour warranty.

LEVEL 1 - Cost Analysis	✂	✂
Software & Hardware	✂	✂
Cabling & Installation	✂	✂
NAC costs	✂	✂
Contingency	✂	✂
Total	✂	✂
Total minus the NAC costs	✂	✂

Key Information / Benefits

- The new hardware will be installed in place of the existing obsolete routers on existing racks in the equipment rooms of each site. New cabling will be installed to replace the existing cabling. Each site will be upgraded sequentially. New security features will be enabled once all the old hardware is removed. The completed installation will be more resilient, reliable and secure,
- The new hardware will be more powerful which will allow for faster transfer of data and quicker automatic rerouting in the event of line failures.
- Spares for the new equipment will be placed in stores in Dublin and Ballycasey and will be readily available to ensure continuity of service.
- Continuity of the service provision.

VHF Replacement Programme

Project Summary

The provision of an IP enabled VHF / UHF Radio service which will align to the upgrade of IAA Voice Communication switches at Dublin, Cork, Ballycasey, Shannon Tower and CE-ROC sites.

Project Details Summary	The VHF / UHF communications is the primary method used to communicate with aircraft for Air Traffic Control (ATC) Services. The safe delivery of ATC communications requires periodic update and replacement of the underlying communication assets supporting this mission critical service. Under this project the IAA will replace legacy VHF / UHF Radio equipment with IP based VHF / UHF Radio infrastructure primarily to address the obsolescence of the communications infrastructure. This project is part of a strategic initiative involving roll out of next generation ATC IP Voice Communications Systems. The existing ageing VHF / UHF radio equipment must also be replaced with IP Radio equipment in order to connect to the new IP Voice Communications Systems (VCS).
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current quotations from relevant industry contractors.
OPEX Impacts	✂
Project Output	Enhanced and Extended Radio Coverage with associated resilience will support ATC's Voice Communications to the Controller Working Positions and ultimately allow for the safe continuity of En-route and Terminal ATC Services. The VHF Radio replacement programme will benefit the IAA - • Through the additional resilience enabled through installation of new IP VHF / UHF Radio to our main En-route and Terminal Centres / Towers. • Allows the authority to address current high maintenance costs — Typically new IP Radios will guarantee a 10-year window of low maintenance and a 2-year warranty. • IP enabled VHF / UHF radios will enable the remote monitoring of radios which will reduce onsite maintenance costs.
Asset life	8 years

Project Delivery Key Milestones	
Milestone	**Completion date**
• Tender contract & vendor selection	2020 / 2021
• Dublin installation	2021
• Cork installation	Q1 2022
• Woodcock Hill & Mount Gabriel installations	Q3 2022
• Dooncarton & Glen Columcille installations	Q1 2023
• Shannon Tower Installation	Q3 2023

Deliverables

Dublin ACC / Tower VHF Radio Replacement with IP VHF Radio:

- Procure, install and commission new IP VHF & UHF radios for Dublin ACC and Tower operations. Additional radios to be procured to cover the new Tower and dual approach terminal services requirements.
- Procure, install and commission new antennae and associated equipment for the four Dublin radio sites.

Cork Tower VHF Radio Replacement with IP VHF Radio:

- Procure, install and commission new IP VHF & UHF radios for Cork Tower operations.
- Procure, install and commission new antennae and associated equipment for the two Cork radio sites.

Shannon Tower VHF Radio Replacement with IP VHF Radio:

- Procure, install and commission new IP VHF & UHF radios for Shannon Tower operations.
- Procure, install and commission new antennae and associated equipment for the two Shannon Tower radio sites.

En-route remote radio sites VHF / UHF Radio Replacement with IP VHF / UHF Radio:

- Procure, install and commission new IP VHF & UHF radios for all seven remote radio sites for En-route operations. Additional radios to be procured for expanded High Level and Low Level En-route services requirements.
- Procure, install and commission new antennae and associated equipment for the seven Enroute remote radio sites.

Cost Analysis	✂	✂
Dublin VHF Project Costs	✂	✂
Woodcock Hill VHF Project Costs	✂	✂
Cork VHF Project Costs	✂	✂
Shannon VHF Project Costs	✂	✂
Mt. Gabriel VHF Project Costs	✂	✂
Dooncarton VHF Project Costs	✂	✂
Glencolumkille VHF Project Costs	✂	✂
Integration to Voice Switches at each ATCC / TWR	✂	✂
Total	✂	✂

Key Information / Benefits

Business Continuity

- Replacement of ageing VHF/UHF infrastructure

Efficiency

- Greater efficiency through the introduction of remote management capability and the reduction of high maintenance costs.
- The technology acquired will include a 2-year manufacturer warranty which will provide stability and higher availability across the ATM estate.
- IAA Technology will drive operational efficiency through efficient use of our resource pool to parallel a number of activities related to the overall upgrade of our Voice Communications infrastructure.

Frequency Expansion Programme

Project Summary

The strategic upgrading of critical Voice Communications infrastructure by enhancing the coverage of our VHF radio services at new geographical locations and adding additional frequencies at Dublin and Shannon Airports to facilitate National Aeronautical events.

Project Details Summary	The IAA's VHF (Very High Frequency) coverage needs to be extended and improved in specific regions. This project makes provision for the expansion of the number of transmitter / Receiver sites, additional transmitters / receivers, masts and cabins, as required, to meet regulatory requirements. Provision is also made for site development. The success of this project is not contingent on the acquisition of new sites; it is proposed to use sites where the IAA already has services in order to avoid incurring additional operational expense (site rentals). The scope of the project includes acquire the Radio Frequencies to support the following activity/projects and the installation testing and commissioning activity required to enable the services on our Primary ✂Radios and our back-up ✂radio systems.
Category	RP3- Technology Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Business Continuity/ Regulatory
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current quotations from relevant industry contractors
OPEX Impacts	✂
Project Output	The addition of a new VHF radio site at Knock Airport to enhance low level coverage in the North West region (119.075MHz). • The addition of a new VHF radio site at Mohercrom (2RN / RTE site) to enhance low- level coverage in the North East region (119.075MHz). • Enhancing Search and Rescue service with the addition of frequency 123.1 to enable extended coverage over Ireland. • National Aeronautical Events Requirements — we require2 x VHF Frequencies to support National Aeronautical events. • We require 2 x UHF Frequencies to support military and state aircraft.
Asset life	8 years

Project Delivery Key Milestones	
Milestone	Completion date
Tender contract & vendor selection	2019
Dublin installation	Q4 2020
Woodcock Hill, Rosslare & Mount Gabriel installations	Q3 2020
Dooncarton & Glen Columcille installations	Q4 2021
Shannon Installation	Q2 2022
Knock Installation	Q2 2023
Mohercrom Installation	Q4 2023

Deliverables

- The addition of a new VHF radio site at Knock Airport to enhance low level coverage in the North West region (119.075MHz).
- The addition of a new VHF radio site at Mohercrom (2RN / RTE site) to enhance low level coverage in the North East region (119.075MHz).
- SAR (Search and Rescue) frequency 123.1 requirement.
- 123.1 RBS required at Malin, BCY & Knockgour. ✂
- 123.1 - ✂– Rosslare, Mt. Gabriel, Woodcock Hill, Dooncarton & Glen Columcille
- 2 new area VHF frequencies for National Aeronautical events (main and standby) - 119.6 and 122.55. Required for Dublin and Shannon Airports. ✂
- 2 UHF frequencies for Dublin (main and backup) for state aircraft / military. ✂

Level 1 Cost Analysis

Cost Analysis	✂	✂
Knock Airport Project Costs	✂	✂
Mohercrom Project Costs	✂	✂
Search and Rescue VHF Project Costs	✂	✂
National Aeronautical Events and Military VHF and UHF Project Costs	✂	✂
Total	✂	✂

Key Information / Benefits

- Enhanced and Extended Radio Coverage with associated resilience will support ATC's Voice Communications to the Controller Working Positions and ultimately allowing for the continuity of En-route and Terminal ATC Services.
- Discrete but safety critical non-core ATC Functions such as SAR, FIS and National Aeronautical Events will benefit through provision of enhanced and resilient radio coverage across our VHF communications infrastructure.
- Additional coverage and resilience of low-Level frequency 119.075 offering enhanced control and management of Small Aircraft and Recreational Aircraft for ATC thus enhancing the safety of our overall system.
- Addition of Radio Frequency 123.1 for our Search and Rescue function to support the emergency services through the provision of extended coverage.
- Addition of the National Aeronautical Events VHF frequencies 119.6 & 122.55 and two UHF frequencies enabling ATC to provide enhanced management for National Aeronautical Events and for Military/State events.

Tower Training Simulator

Project Summary

The objectives of this project are to ensure that training can continue to be provided on the EFS(I-ATS) system for Terminal Services ATCOs. The new EFS(I-ATS) training rig is being future proofed such that it is capable of delivering training for Collaborative Decision Making and Parallel Runway Operations.

Project Details Summary	Purchase, install and commissioning of a new tower simulator at Dublin to support training for the I-ATS System (Electronic Flight Strips, Collaborative Decision Making, Departure clearance and surface movement radar display). The new I-ATS (EFS/DMAN/ASMGCS) Rig will be configured such that the Micronav Simulator which drives the Out of the Window view would also drive the EFS/DMAN/ASMGCS Training Rig, Ideally: • The Micronav (BEST) Simulator should connect to the EFS via a simulated AFTN & OLDI connection to exchange information in the same way as the live environment. • The Micronav (BEST) Simulator should connect to the ASMGCS to send ASTRIX CAT simulated track data to ensure the aircraft position on the out of the window view matched the track position on the ASMGCS. • The Micronav (BEST) Simulator should connect to the EFS to simulate the daa AOS (airport connection) to exchange Parking Stand numbers and A_CDM information. • The Micronav (BEST) Simulator should simulate the DCL messages so that we can train students on the use of the DCL. • There should be a connection to the DMAN so that the students can be trained in the use of the DMAN with A_CDM. The new rig must have capability of being split in 2 to match best capability and flexibility. The integration of the new I-ATS Training Rig and BEST is an EPN task, given that the changes will be done in BEST. This will ensure that the I-ATS Training Rig uses the same Software as the operational Rig. Currently there is a shared Training/ Validation Rig, however now that the I-ATS/EFS is operational, the sharing of an I-ATS rig for Validation and Training is no longer sustainable. Given that I-ATS will be the main system for all IAA towers for the foreseeable future, it is a key system for Terminal services and as for the COOPANs System, separate Operational, Validation and Training rigs are required. .
Category	RP3- Technology Terminal Services Operational Training
Primary Driver	Business continuity
Secondary Driver	Staff training

Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The hardware and software costs were estimates in 2017 based on previous purchases. The internal manpower costs are estimates for system installation, commissioning.
OPEX Impacts	✂
Project Output	The objectives of this project are to ensure that training can continue to be provided on the I-ATS system for Terminal Services ATCOs. The new I-ATS training rig is being future proofed such that it is capable of delivering training for Collaborative Decision Making and Parallel Runway Operations.
Asset life	8 years

Project Delivery Key Milestones

Project delivery in 2022 – 2024

- Tender Q4 2022
- System purchase Q 1 2023
- System FAT Q2 2023
- System SAT Q4 2023
- Operationally Deployed Q4 2024

LEVEL 1 - Cost Analysis	✂	✂
System purchase cost	✂	✂
Installation costs	✂	✂
Total	✂	✂

Key Information / Benefits
The benefits of the project include

- Ongoing ability to deliver I-ATS training at Dublin ATCC,
- Ongoing ability to deliver Dublin ACDM refresher training
- Future proofing to meeting training requirements for Parallel Runway Operations i.e. adequate capacity.
- Ongoing ability to deliver Dublin Aerodrome Control Instrument (ADI) i.e.
- Tower unit courses to new recruits and additional ADI unit endorsements to current staff
- Ongoing ability to deliver Dublin ADI refresher training to ADI staff.

IAA Smartmessenger (AFTN/AMHS) System Enhancements And ROFDS Contingency

Project Summary

To upgrade the Irish ANSPs AFTN/AMHS communications equipment which is now obsolete. In addition, there is an ICAO mandate to support the delivery of IWXXM messages.

Project Details Summary	The scope of this project is to upgrade the Irish ANSPs AFTN/AMHS communications equipment which is necessary for the provision of ATM services in Irish controlled airspace. In addition, there is an ICAO mandate to support the delivery of IWXXM messages to MET Eireann. This project will enhance the system as follows: • New hardware, Operating System and application security upgrades, OS hardening, User authentication, Anti-virus protection • Capability to handle IWXXM messages. This is a new ICAO requirement to handle the distribution of MET messages between MET centres internationally over the AFTN/AMHS network instead of independent lines used in the past. • Provide additional AFTN hardware in NAC as a contingency for ROFDS failures. .
Category	RP3- Technology Business continuity
Primary Driver	Business continuity
Secondary Driver	Safety and Efficiency
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on previous AFTN system upgrades and hardware prices.
OPEX Impacts	✂
Project Output	Business continuity and meeting IAA safety obligations.
Asset life	8 years

Project Delivery Key Milestones

Project delivery in 2021 – 2023

- Start date Q3 2021
- Installation Q4 2021
- Validation Q1 2022
- Deployment with MET Q1 2023

LEVEL 1 - Cost Analysis	Represents % of total	Total
Software	✂	✂
Hardware	✂	✂
Installation	✂	✂
Total	✂	✂

Key Information / Benefits

- Replacement of end-of-life essential ATM equipment
- Business continuity assurance
- Compliance with safety & regulatory requirements
- Improved system security

Emergency Air Situation Display System (EASDS) Replacement

Project Summary

The Replacement of the current Emergency Air Situation Display System (EASDS) which was introduced into operational service in 2008.

Project Details Summary	The current Emergency Air Situation Display System (EASDS) was introduced into operational service in 2008. It is used as a contingency ATC system in the event of a major failure of the COOPANS system. It can be used in a "clear the skies" scenario to ensure that all aircraft In Irish airspace can land safely or transfer to a neighbouring service provider. It is also approved for a reduced service continuous use to provide an on-going air traffic control service in the event of a COOPANS failure. The existing system is now at an age that it is necessary to replace it. The existing EASDS system has very little in built redundancy and IAA Operational requirements have changed since it was first deployed. In addition, since 2014 IAA has expanded the use of EASDS to Cork, Shannon Tower, CEROC and Dublin new Tower.
Category	RP3- Technology Business continuity
Primary Driver	Business continuity
Secondary Driver	Safety and Efficiency
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on estimated IAA estimation methods for purchase and installation of ATM systems. Liaison with COOPANS partners provided some addition information on their past purchases.
OPEX Impacts	✂
Project Output	Back-up system to COOPANS providing business continuity and meeting IAA safety obligations. For the following sites: • Shannon ATCC including Cork Tower and Shannon Tower. • Dublin ATCC including Dublin Tower • CEROC ATCC.
Asset life	8 years

Project Delivery Key Milestones
Project delivery in 2021 – 2023 • Tender Q2 2021 • System purchase Q 4 2021 • System FAT Q1 2022 • System SAT Q2 2022 • Operationally Deployed in Bcy, Crk, SNN Twr Q4 2022 • Operationally Deployed in CEROC Q4 2022 • Operationally Deployed in Dub Q2 2023

LEVEL 1 - Cost Analysis	✂	✂
System purchase & Deployment costs	✂	✂
Hardware Installation	✂	✂
Total	✂	✂

Key Information / Benefits

- Replacement of end-of-life essential ATM system
- Business continuity assurance
- Compliance with safety & regulatory requirements
- Training will be possible on the new simulator to satisfy safety requirements.

New Voice Communications Switch

Project Summary

The replacement of VCS systems at Cork, Ballycasey and Shannon tower along with the associated professional services required to commission all three systems. This project will be delivered in co-ordination with the VCS installations at Dublin Airport under project R035 (New Tower Parallel Runway).

Project Details Summary	Under this project IAA communications domain will complete the strategic replacement of critical Voice Communications Switch (VCS) Infrastructure. ✂ The project will replace VCS systems at Cork, Ballycasey and Shannon tower. Dublin ACC / Low Tower was also included in this project.
Category	**RP3- Technology** Terminal & En-route ATC services
Primary Driver	Safety
Secondary Driver	Obsolescence, Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current quotations from relevant industry contractors. The internal manpower costs are based on known system installation, commissioning and engineering training and documentation preparation time scales.
OPEX Impacts	✂
Project Output	The deployment of VCS Systems at all 4 sites will ensure IAA receive best economic value for system replacement across our full ATC estate. The project will remove the risk exposure that currently exists around manufacturer and support services from the current vendors.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
• Tender vendor selection & contract	2018
• Dublin ACC & High Tower rollout	2021
• Cork Tower Roll Out	2022
• Shannon Tower Roll Out	2023
• Ballycasey contingency VCS	2023
• Ballycasey main VCS roll out	2024

Deliverables

Dublin ACC Voice Communications Switch:

- Dual Redundant Server based IP VCS Switch with Air/Gnd and Gnd/Gnd connectivity.
- 50 HMI CWP positions to include ACC, Low Tower & High Tower.
- Connection to local Dublin VHF radio sites and MFC, analogue PABX, PSTN, VOIP IP (SIP), E1 and ISDN interface GND/GND connectivity.
- Interconnectivity to Dublin High Tower VCS for contingency operations and enhanced redundancy.

Cork Tower Voice Communications Switch:

- Dual Redundant Server based IP VCS Switch with Air/Gnd and Gnd/Gnd connectivity.
- 6 HMI CWP positions.
- Connection to local Cork Tower VHF radio sites and MFC, GND/GND connectivity to SNN TWR, BCY, Dublin and other sites.
- Interconnectivity to SNN Tower for Remote Tower functionality.

Shannon Airport Voice Communications Switch:

- Dual Redundant Server based IP VCS Switch with Air/Gnd and Gnd/Gnd connectivity.
- 5 HMI CWP positions.
- Connection to local Shannon Tower VHF radio sites and GND/GND connectivity to Cork TWR, BCY, Dublin and other sites.
- Interconnectivity to Cork Tower for Remote Tower functionality.

Ballycasey Voice Communications Switch:

- Dual Redundant Server based IP VCS Switch with Air/Gnd and Gnd/Gnd connectivity.
- 50 HMI CWP positions.

- Connection to the following VHF remote sites:
  - Woodcock Hill, Mt. Gabriel, Cork Tower, Shannon Tower, Dooncarton, Glencolumkille, Dublin, Rosslare and 2 additional VHF Sites.
- Ground/Ground connectivity to Cork Tower / Shannon Tower & Dublin and Baldonnel, NATS (Prestwick and Swanwick), DSNA (Brest), CFMU and other sites.
- Interconnectivity to Shannon and Cork Towers as required.

Ballycasey Contingency / T&V Voice Communications Switch:

- Dual Redundant Server based IP VCS Switch with Air/Gnd and Gnd/Gnd connectivity.
- 20 HMI CWP positions.
- Connection to the following VHF remote sites:
  - Woodcock Hill, Mt. Gabriel, Cork Tower, Shannon Tower, Dooncarton, Glencolumkille, Dublin, Rosslare and 2 additional VHF Sites.
- Ground/Ground connectivity to Cork TWR / SNN TWR & Dublin and Baldonnel, NAT S (Prestwick and Swanwick), DSNA (Brest), CFMU and other sites.
- Interconnectivity to Shannon and Cork Towers as required.

Level 1 Cost Analysis

Cost Analysis	✂	✂
Dublin Voice Communications Switch - supply, install and testing / commissioning.	✂	✂
Cork Voice Communications Switch - supply, install and testing / commissioning.	✂	✂

Shannon Airport Voice Communications Switch supply, install and testing / commissioning.	✂	✂
Ballycasey Voice Communications Switch supply, install and testing / commissioning inclusive connectivity to 10 remote VHF sites.	✂	✂
Ballycasey Contingency / T&V Voice Communications Switch supply, install and testing / commissioning inclusive connectivity to 10 remote VHF sites.	✂	✂
Total	✂	✂

Key Information / benefits

Economies of scale

- By acquisition of VCS Systems at all 4 sites under this Project reference, it will ensure IAA receive best economic value for VCS system replacement across our full ATC estate.
- IAA Technology will drive operational efficiency through the synchronous deployment of our own technical resource pool to parallel a number of activities related to the VCS Projects.

Risk mitigation

- The project will remove the risk exposure that currently exists around manufacturer and support services from the current vendors.

Technology

- Best in class technology, future-proofed & scalable, aligns to IAA Corporate Strategy and to Eurocontrol and SESAR best practice guidelines. Streamlines training and spares / maintenance programme.

Navaids Replacement Program

Project Summary

The Replacement of the existing Instrument Landing System (ILS) and Instrument Runway Visual Range (IRVR) systems at the three state airports Dublin, Shannon and Cork.

Project Details Summary	The aim of this project is to replace the existing Instrument Landing Systems {ILS) and Instrument Runway Visual Range (IRVR) systems at the three state airports. The ILS and IRVR are vital to the provision of safe and efficient Terminal ATC services. The existing IRVRs were installed between 2006 and 2007. The existing ILS's were installed between 2004 and 2007. The current systems are reaching end-of-life and some components of the systems are obsolete. Technical services are planning the replacement program, on a phased basis, starting in 2020 and plan to complete the installations by 2024. Technical services are also planning to add backup IRVR sensors to improve the IRVR resilience.
Category Services	**RP3- Technology** Operational Service Delivery Terminal
Primary Driver	Safety
Secondary Driver	Obsolescence, Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	The costs are based on current quotations from relevant industry contractors. The internal manpower costs are based on known system installation, commissioning and engineering training and documentation preparation time scales.
OPEX Impacts	✂
Project Output	The objective of this project is to replace existing IRVRs and ILS's to ensure that the IRVR and ILS systems continue to provide a safe, reliable and cost-effective service to our users and customers.
Asset life	12 years

Project Delivery Key Milestones

Milestone	Completion date
IRVR	Q4 2021.
ILS Shannon Airport	Q4 2022.
ILS Cork Airport	Q4 2023
ILS Dublin Existing Runways	Q4 2024

LEVEL 1 - Cost Analysis	✂	✂
IRVR Costs	✂	✂
ILS Equipment Costs	✂	✂
Civil costs	✂	✂
	✂	✂
Total	✂	✂

Key Information / Benefits

The installation of new ILS and IRVR systems at the three state airports will have the following benefits:

- Continued compliance with all ICAO categorisation requirements.

COOPANS Projects

COOPANS Builds 3.6 to 3.8 Budget

Project Summary

Enhancements to system capabilities, addition of FAST DBS (Final Approach Spacing Tool Distance Based Separation), System safety enhancements and Oceanic improvements.

Project Details Summary	The scope of this project is for COOPANS Builds 3.6 to 3.8 planned for implementation in the 2020 and 2023 timescales. To include engineering design activities and a ✂ study required for the long-term development of the COOPANS roadmap. Note this project does not include the next generation architecture/FDP system enhancements which is the subject of future EC IR requirements.

Functionality	Functionality
Conflict Detection Outside AOR	CAT004 Alert Distribution
ASP and ARC Menu update	Multi QDM
Last Sector Skip	SEP Tool Improvements
Wake Turbulence Category label highlighting	FAST Step 1 – RECAT and Spacing Tool
Quick APL creation	Traffic Synchronisation (SWIM)
Oceanic Handling Improvements	MTCD Improvements Step 2
CPDLC FANS Safety Changes	RCMS Evolutions
Controlled Flight Plan Lfunc State Improvements	ACF Field
UM79 CPDLC Message Introduction	Rackable Workstations
Topsky Safety Nets Step 3	BEST Positions Operating System
Quick Access to FLEG Editing	SeqOutput AMAN MAESTRO
MTCD Improvements Step 1	Extension of ODS Resolution to 4K & ODS external displays

.

Category	RP3- Technology Service enhancement / Business continuity
Primary Driver	Safety and Efficiency
Secondary Driver	Service enhancement
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on IAA estimation methods for purchase and installation of COOPANS ATM systems releases.
OPEX Impacts	✂
Project Output	New functionality driving service improvement, safety enhancements, increased system security, ATCO efficiency
Asset life	8 years

Project Delivery Key Milestones

Project delivery in 2021 – 2023

- Harmonistation and Build definition plus Contracts for individual builds 2021 -2023
- System FAT B3.6 Q3 2019
- System SAT B3.6 Q4 2019
- Operationally Deployed B3.6 Q2 2021
- System FAT B3.7 Q3 2020
- System SAT B3.7 Q1 2021
- Operationally Deployed B3.7 Q4 2021
- System FAT B3.8 Q3 2021

✂

LEVEL 1 - Cost Analysis	✂	✂
Harmonization and Build definition	✂	✂
B3.6 + CTR51 B3.6 Prep + CTR052 RESMS + CTR53 BEST OS + CTR54 Windows 10 licences	✂	✂
B3.6.2 + CTR58 ADS-B	✂	✂
Co-Flight Study + CTR56 Gartner Audit	✂	✂
B3.7	✂	✂
B3.7+ + CTR57 PCR corrections + CTR038 Baldonnel + CTR039 MSTS ADS-B	✂	✂
B3.8 + CTR55 Early demo	✂	✂

+ CTR59 XDL for FAST		
B3.8+	✂	✂
Total	✂	✂

Total payments in RP2 period		**€4,112,522**
Total payments in RP3 period		✂

Key Information / Benefits

- Enhanced system functionality in the areas of:
  - Oceanic Handling – Controller tools to assist in Oceanic Clearance implementation and application of required time separations
  - CPDLC – additional messages with HMI and FDP support
  - Safety Nets – improved tuning capabilities and analysis functions
  - MTCD – addition of conflict detection outside AOR, improvements to the MTCD configuration and HMI improvements
  - APP Services – improved HMI to assist in the application of Wake Turbulence Separations
  - Controller HMI – improvements in Flight Leg editing, abbreviated FPL creation, last sector skip, Multi QDM tool, label menu updates and implementation of Vertical SEP Tool
- Improved system security
- FAST DBS Implementation – Final Approach and Spacing Tool using Distance Based Separation and addition of RECAT Wake Turbulence matrix
- IAA remains in line with other COOPANS partners for builds and system support

COOPANS 2019 Roadmap Builds

Project Summary

Enhancements to system capabilities and System Wide Information Management (SWIM) infrastructure, the addition of FAST TBS (Final Approach Spacing Tool Time Based Separation) plus TMCS obsolescence. Development of new functionality to enhance existing services and new ATC controller functionality. In addition, this project will cover the initial phase of the planned system design of a new COOPANS Digital ATM platform as part of a SESAR3 Joint Undertaking activity.

Project Details Summary

The scope of new project is for COOPANS 2019 Roadmap Builds B3.9, B3.10, including enhancing SWIM capabilities and infrastructure and possibly a B3.11 planned for Implementation in the 2023 and 2024 timescales to enhance controller work tools, system security and safety. These contracts will be signed in 2022-23. The project also includes the initiation of a project to create a new COOPANS Digital ATM system as part of a SESAR3 Joint Undertaking activity with ✂. This project will plan the design of the next generation architecture/FDP system enhancements which is the subject of future EC IR requirements. Note an additional project will be required to develop and deploy this new Digital ATM architecture.

COOPANS is extending its ambition to cooperate on the entire ATM platform, integrating all ATM system solutions into ONE coherent and efficient COOPANS Digital ATM platform in the en-route and approach domains. We have identified the key requirements from the ATS providers, like automation in order to reduce workload per flight, lower costs for the end users, scalable capacity on demand, resilience to contribute to availability and of course – safety and security. Therefore, COOPANS have prioritised the key programme objectives which will contribute to achievement of these requirements:

- Open architecture (SRIA Roadmap 3.5)
- Automation (SRIA Roadmap 3.1 & 3.2 & 3.8)
- Interoperability (SRIA Roadmap 3.1 & 3.3 & 3.9)

Furthermore, new distributed technologies and environmentally friendly solutions are expected to influence the COOPANS programme activities and enable future growth and air traffic versatility (in particular - SRIA Roadmap 3.4 & 3.6 & 3.7).

COOPANS recognises the political initiative to split the ANSP businesses into ADSP and ATSP but intends to keep them tightly connected to ensure end-to-end effectiveness of future investments by establishing one common ADSP with initially six member ATSPs.

The new agile ways of working will be introduced in COOPANS internally and between COOPANS and the suppliers, to achieve shorter release cycles between innovations and to shorten up the time to deployment.

Functionality	Functionality
Blind Spot	SWIM Pack 2
TCT (Tactical Controller Tool)	Airspace Management Interface
OLDI 4.3	RCMS Step 2
Additional CPDLC Messages	Cyber Security Step 2
FAST Step 2	Extended AMAN
TCT What else probe	Automation Tools

Category	RP3- Technology Service Enhancement /Business continuity
Primary Driver	EC IR Requirements
Secondary Driver	Service enhancement
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on IAA past experience for purchase and installation of COOPANS ATM systems releases
OPEX Impacts	✂
Project Output	Compliance with EC IR Requirements, New functionality driving service improvement, increased system security, ATCO efficiency
Asset life	8 years

Project Delivery Key Milestones	
Project delivery in 2021 – 2024	
• Harmonization, build definition and contract Q1 2022	
• Purchase Order	Q1 2022
• System FAT B3.9	Q3 2022
• System SAT B3.9	Q1 2023
• Operationally Deployed B3.9	Q4 2023

LEVEL 1 - Cost Analysis	Represents % of total	Total
Harmonization and Build Definition, B3.9, B3.10, including SWIM infrastructure & B3.11.	✂	✂
COOPANS Digital ATM platform design	✂	✂
Total	✂	✂
RP3 - The project will extend beyond 2024. **Total spend to and including 2024**	✂	✂

Key Information / Benefits

- Enhanced system functionality in the areas of:
  - CPDLC
  - Controller Tools
  - AMA Message Exchange
  - Blind Spot
- Improved system security
- Increased ATCO efficiency
- FAST TBS Implementation
- Migration to SWIM for some data services.
- COOPANS Digital ATM design will allow IAA to comply with EC implementing rules.
- IAA remains in line with other COOPANS partners for builds and system support

Replacement of COOPANS Hardware

Project Summary

Replacement of COOPANS Hardware – Controller workstations, Servers and network equipment which make up the COOPANS ATM systems in Ballycasey, Shannon Tower , Cork Tower , CEROC and Dublin ATCCs.

Project Details Summary	The scope of this investment is to purchase new hardware to replace the existing COOPANS hardware and associated licences in all IAA sites. The existing hardware servers and controller working positions for the COOPANS air traffic management systems have been in service since 2011 and the supporting hardware is now obsolete. The equipment shall conform to the required COOPANS specifications as agreed with the COOPANS software supplier ✂. The workstations and servers replacement will commence at the end of 2018 and will be completed in early 2019. The network replacement will commence in 2019 and was completed in 2020.
Category	RP3- Technology Business continuity
Primary Driver	Business continuity
Secondary Driver	Safety and Efficiency
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been calculated using rough order of magnitude (ROM) estimates based on similar computer equipment prices for purchase and installation of the hardware. A ROM figure for the ✂ services for the specification and validation of the COOPANS system architecture are based on previous ✂ contracts
OPEX Impacts	✂
Project Output	An Emergency Air Situation Display for: • Shannon ATCC including Cork Tower and Shannon Tower. • Dublin ATCC including Dublin Tower • CEROC ATCC.
Asset life	8 years

Project Delivery Key Milestones

Project delivery in 2018 - 2021

- ✂ contract for the specification and validation of the COOPANS system network architecture.
- Tender for new computer hardware Q2 2018
- Contract for new computer hardware Q4 2018
- Operationally Deployed 2018 -2019
- Tender for new network hardware Q1 2019
- Contract for new computer hardware Q3 2019

- Operationally Deployed 2019 -2021

LEVEL 1 - Cost Analysis	Represents % of total	Total
Dublin & Contingency	✂	✂
Shannon Tower	✂	✂
Cork Tower	✂	✂
Shannon & Contingency CVF & CEROC	✂	✂
Installation	✂	✂
Note the ✂ costs of ✂ has been split across the sites proportionally.	✂	✂
Total	✂	✂
Total RP2	✂	✂
Total RP3 In RP3 period total spend (in 2021) Shannon and Dublin	✂	✂

Key Information / Benefits

- Replacement of end-of-life essential ATM system
- Business continuity assurance
- Compliance with safety & regulatory requirements

Surveillance / Mechanical and Electrical

ARTAS & SASS-C Upgrades

Project Summary

The Surveillance Data Tracking systems (ARTAS) and Surveillance performance validation systems (SASS-C) in Dublin Ballycasey and CEROC must be upgraded to the supported Eurocontrol release versions in the RP3 period.

Project Details Summary	This project will ensure that the Surveillance-Data Tracking systems (ARTAS) and Surveillance performance validation systems (SASS-C) in Dublin, Ballycasey and CEROC are upgraded to the supported Eurocontrol release versions in the RP3 period. Dual ARTAS hardware and software systems are to be replaced in; Dublin ONL (Online), Dublin CVF (contingency), Ballycasey ONL, Ballycasey CVF, CEROC (En Route Contingency centre Ballygirreen) and Dual spares are to be delivered in Dublin and Ballycasey. SASS-C hardware and software systems are to be replaced in; Dublin ONL (Online), Dublin CVF (contingency), Ballycasey ONL, Ballycasey CVF, CEROC (En Route Contingency centre Ballygirreen) and two mobile systems are to be delivered to facilitate SASS-C analysis at Radar sites.
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Obsolescence
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	New ARTAS, Surveillance Tracker systems at the Dublin, Ballycasey and CEROC Air Traffic Control Centers (ATCCs) site. ✂. New SASS-C, Surveillance Recording and Performance analysis systems at the three ATCCs and two mobile systems. ✂
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
New SASS-C systems at the ATCCs & mobile	Q3 2022
Capitalise SASS-C	Q3 2022
New ARTAS systems at the ATCCs	Q4 2023
Capitalise ARTAS	Q4 2023

Deliverables

Fourteen new ARTAS server systems & nine SASS-C analysis servers & recording systems at the following locations:

1. Dual ARTAS at Ballycasey ONL & CVF (4 x ARTAS)
2. Dual ARTAS at CEROC (2 x ARTAS)
3. Dual ARTAS at Dublin ONL & CVF (4 x ARTAS)
4. Dual ARTAS spares at Dublin and Ballycasey ATCCs (4 ARTAS)
5. SASS-C at Ballycasey ONL & CVF (2 x SASS-C)
6. SASS-C at CEROC (1 x SASS-C)
7. SASS-C Dublin ONL & CVF (2 x SASS-C)
8. SASS-C spares at Dublin and Ballycasey ATCCs (2 SASS-C)
9. Mobile SASS-C systems (2 SASS-C)

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
New ARTAS Systems	✂	✂
New SASS-C Systems	✂	✂
Total	✂	✂

Key Information / Benefits

- This project will ensure that the Surveillance-Data Tracking systems (ARTAS) and Surveillance performance validation systems (SASS-C) in Dublin, Ballycasey and CEROC are upgraded to the supported Eurocontrol release versions in the RP3 period.
- ARTAS is the main Surveillance Tracker system used to combine all the surveillance information from all Radar and ADS-B sensors nationally to produce an accurate air situation picture for use by Air Traffic Controllers. It is important to operate a supported version of ARTAS to ensure timely support in the event of issues.
- Surveillance Performance Validation of all surveillance data used by ATC is now a regulatory requirement (EU 1207/2011).

ASMGCS Enhancements

Project Summary

This project covers enhancements required by Dublin ATC Operations to the Dublin Advanced Surface Movement Guidance and Control System (ASMGCS). The enhancements improve the Safety, Performance and functionality of the system to address known shortcomings.

Project Details Summary	This This project covers enhancements required by Dublin ATC Operations to the Dublin Advanced Surface Movement Guidance and Control System (ASMGCS). The ASMGCS system has been in operation in Dublin for over 12 years and has been a key contributor to safe and efficient operations in Dublin Airport. The enhancements improve the Safety, Performance and functionality of the system to address known shortcomings as follows: • Improved MLAT coverage and accuracy at the B7 threshold of Runway 10 End South, by adding MLAT sensor. • 8 x New ATCC ASMGCS screens. Q3 • Dual Opsview servers for contingency, airfield drivers and IAA HQ display. • Three static SMR reference markers on the airfield & one mobile marker.
.	
Category	RP3- Technology Dublin Terminal services
Primary Driver	Safety
Secondary Driver	Obsolescence/Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	Improved MLAT coverage and accuracy at the B7 threshold of Runway 10 End South. 8 x New ATCC ASMGCS screens. Dual Opsview servers for contingency, airfield drivers and IAA HQ display. Three static SMR reference markers on the airfield & one mobile marker.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
• MLAT sensor at the B7 threshold of Runway 10 South.	Q3 2021
• 8 x New ATCC ASMGCS screens.	Q1 2022
• Dual Opsview servers	Q2 2022
• 3 SMR reference markers & 1 mobile marker.	Q4 2021

✂

Deliverables

- Additional MLAT Sensor at B7 threshold of Runway 10 South end.
- 8 x high brightness screens and associated ATC console mounts in Dublin ATCC.
- Dual redundant "Opsview" servers, user and server licenses and associated redundant firewalls.
- Three static SMR reference markers on the airfield & one mobile marker.

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
MLAT sensor at the B7 threshold of Runway 10 South	✂	✂
8 x New ATCC ASMGCS screens.	✂	✂
Dual Opsview servers	✂	✂
3 SMR reference markers & 1 mobile marker.	✂	✂
Total	✂	✂

Key Information / Benefits

- This project is to continue the downward trend in runway incursions and improve the functionality and safety benefits of the ASMGCS at Dublin Airport.
- The enhancements will deliver the enhanced safety and functionality benefits to extended users such as ground vehicle drivers, by introducing the capability to have a portable ASMGCS Opsview display in their vehicles to provide full situational awareness even when in poor visibility conditions.
- The project also addresses the known MLAT coverage shortcoming at B7 threshold of Runway 10 South end.

ATC Screen Replacement

Project Summary

The ATC screens in Dublin and Ballycasey ATCCs were installed in 2007 and were upgraded with LED backlights in 2016. These display screens are now at end of life, and this project is to deliver the required replacement ATC screens.

Project Details Summary	This project will replace the obsolete ATC 2K x 2K resolution screens in Dublin and Ballycasey ATCCs. The ATCC screens were initially installed in 2007 and upgraded with LED backlights in 2016 to extent their usable life. Screens in Ballycasey (75) and Dublin (36) are to be replaced with 111 screens as follows: 1. Ballycasey ONL 32 console screens 2. Ballycasey CVF 12 screens, 6 console and 6 desktop 3. Ballycasey EPNI 20 desktop screens 4. Ballycasey Replay 2 desktop screens, TCD 1 desktop screen 5. Ballycasey Spares and 8 x spare screens (2 for EPNI) 6. Dublin ONL 20 console screens (incl. Baldonnell) 7. Dublin CVF 8 desktop screens 8. Dublin Replay 1 desktop screen, TCD 1 desktop screen 9. Dublin Spares and 8 x spare screens.
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Obsolescence/Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	One Hundred and eleven (111) new High-Resolution ATC screens in Dublin and Ballycasey ATCCs as follows: Ballycasey ONL 32 console screens Ballycasey CVF 12 screens, 6 console and 6 desktop Ballycasey EPNI 20 desktop screens Ballycasey Replay 2 desktop screens, TCD 1 desktop screen Ballycasey Spares and 8 x spare screens (2 for EPNI) Dublin ONL 20 console screens (incl. Baldonnell) Dublin CVF 8 desktop screens Dublin Replay 1 desktop screen, TCD 1 desktop screen Dublin Spares and 8 x spare screens.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Ballycasey - 75 screens	Q2 2023
Capitalise Ballycasey Screens	Q4 2023
Dublin - 36 screens	Q4 2024
Capitalise Dublin Screens	Q4 2024

Deliverables

One Hundred and eleven (111) new High-Resolution ATC screens in Dublin and Ballycasey ATCCs as follows:

Dublin ONL & CVF - 36 screens

Ballycasey ONL & CVF - 75 screens

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Dublin - 36 screens	✂	✂
Ballycasey - 75 screens	✂	✂
Total	✂	✂

Key Information / Benefits

- This ATC Screen replacement project addresses the obsolescence of the current ATC screens in Ballycasey and Dublin.
- The reliability and accuracy of the ATC screens contributes to the overall safety of ATC.
- The new screens may also be more energy efficient than the current screens.

BMS Upgrade Dublin and Ballycasey ATCCs

Project Summary

The Building Management Systems in the Dublin and Ballycasey ATCCs are at end of life and must be upgraded in order to ensure the effective management of the building support systems maintaining the optimum environmental conditions for both people and equipment within the buildings.

Project Details Summary	This project will ensure that Dublin ACC and Low tower and Ballycasey administration block Building management systems continue to safely, effectively and efficiently manage the building support systems maintaining the optimum environmental conditions for both people and equipment within the buildings
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Obsolescence/Business Continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	Dublin ACC and Low tower BMS operating with up to date supportable control systems. Ballycasey administration support building BMS operating with up to date supportable control systems.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
BMS Upgrades Dublin	Q4 2022.
BMS Upgrades Ballycasey	Q3 2023.
Capitalise Project T010	Q4 2023

Deliverables

- BMS Upgrades Dublin Q4 2022.
- BMS Upgrades Ballycasey Q3 2023

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
BMS Upgrade Dublin	✂	✂
BMS Upgrade Ballycasey	✂	✂
Total	✂	✂

Key Information / Benefits

This project will ensure that Dublin and Ballycasey Building management systems continue to safely, effectively and efficiently manage the building support systems maintaining the optimum environmental conditions for both people and equipment within the buildings.

New En-Route Contingency Centre at Ballygirreen

Project Summary

The En-route Air Traffic Control Centre (ACC) at Shannon provides a key service on behalf of airspace users. It is vital that an appropriate level of business continuity is in place, which supports IAA in meeting its continuity of service obligations to customers.

Project Details Summary	Build and equip a new En-route contingency centre at Ballygirreen, fit out with 21 ATCO positions. The facility provides up to 100% of the capacity of the Ballycasey centre under single person operation conditions. From an operational perspective ATCO's will use similar procedures and equipment as in normal operations at Ballycasey ACC.
Category	RP3- Technology En-Route services
Primary Driver	Business continuity
Secondary Driver	Revenue protection
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	New En-route contingency building at Ballygirreen ATC systems to enable normal operations Procedures & documentation Safety approvals
Asset life	Building 20 years. ATM systems 8 years

Project Delivery Key Milestones	
Milestone	**Completion date**
• Construction of Centre	Q4 2015
• Fit-Out of Centre	Q2 2019
• Live Trials	Q3 2019
• Facility File Transfer	Q3 2020
• Safety Assessment/Approvals	Q4 2020
• Capitalise Project N004	Q4 2020

Deliverables

- Build a new En-route contingency facility at Ballygirreen with operational capacity for 21 positions.
- Fit out of the new centre with all required ATC systems to facilitate normal ATCO operations.
- Procedures documentation as required for the new facility
- Safety updates & approvals

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Build/construction costs (summary 1)	✂	✂
Fit Out costs (summary 2) • Coopans/ARTAS/Interfaces • Consoles / Cabling etc • VCS/RBS/Rec/Telco • EASDS • Mech Elec, generators/UPS/Switching	✂	✂
Total	✂	✂

Final Cost

Buildings	✂
Network Servers	✂
ATC Systems	✂
Voice Comm System	✂
Reserve Voice Comm System	✂
Voice Comm Recorder	✂
CEROC PABX	✂
Centralised Monitoring	✂
Total	✂

Key Information / Benefits

- Enhanced contingency for IAA customers specifically airlines
- Secure air access for Ireland as an island nation
- Enhanced protection for IAA Revenue

New Dublin Radar 2 Replacement

Project Summary

Dublin Radar 2 is at end of life, and to provide the required radar availability to support 3 NM radar separation in Dublin, it 2 is to be replaced by two new radars, one within the current Radar 2 compound and a second at an off-airfield site.

Project Details Summary	This project will ensure that Dublin ATC has sufficient, reliable and accurate surveillance coverage of Dublin Airspace in order to maintain 3NM horizontal separation of Aircraft. The existing Dublin Radar 2 will remain fully operational during the project delivery to avoid use of 5NM separation during the installation and validation phase of the replacement Radar. It should also be noted that having two Dublin Radars, meeting the minimum requirements for 3NM separation, has resulted in numerous undesirable transitions to 5NM separation, during radar failures and essential planned Radar Maintenance. This project will permanently resolve this issue. This project will have three phases: 1. New Mode-S radar at the Forrest Little (Dublin 2) site. Completed 2019. 2. New combined Mode-S/PSR Radar, at a new off airfield site. Q2 2022. 3. Decommission Dublin Radar 2 – Q3 2022
.	
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project will ensure that Dublin ATC has sufficient, reliable and accurate surveillance coverage of Dublin Airspace in order to maintain 3NM horizontal separation of Aircraft.
Asset life	12 years

Project Delivery Key Milestones

Milestone	Completion date
Mode-S Radar at the Forrest Little site.	Q4 2019
✂	Q4 2019
Combined Mode-S/PSR Radar, off airfield site.	Q2 2022
Decommission Dublin Radar 2	Q3 2022
Capitalise Project Q012	Q4 2022

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
New Mode-S Radar	✂	✂
New Combined Mode-S/PSR Radar	✂	✂
New Radar Site Building*	✂	✂
Total	✂	✂

*Superseded by Property and Security project, T006, for new Radar site purchase and Radar building construction.

Key Information / Benefits

- This Dublin Radar 2 replacement project addresses the current Radar obsolescence problem, with a solution which delivers resilient Surveillance Coverage, which will ensure that ATC delays at Dublin Airport do not arise due to a lack of Surveillance coverage.
- Following the installations of the two new Radars, a failure or maintenance of any one Radar of the three Dublin Radars will have no impact on the provision of 3NM separation in Dublin.

National Generator Replacements

Project Summary

This project delivers power supply resilience to NAC centre and key Radar and VHF Communication sites. The generators at the NAC and several Radar sites are at end of life and the identified VHF Communication sites currently have no backup generator

Project Details Summary	This project delivers power supply resilience to NAC centre and key Radar and VHF Communication sites. The generators at the NAC and several Radar sites are at end of life and the identified VHF Communication sites currently have no backup generator. The specific site requirements are as follows: • NAC – Replacement 100KVA Generator.** • Dooncarton - Replacement 60KVA Generator • Woodcock Hill Radar - Replacement 60KVA Generator • Shannon Radar - Replacement 60KVA Generator • Mt Gabriel Head 1 Radar - Replacement 60KVA Generator • Mt Gabriel Head 2 Radar - Replacement 60KVA Generator • Knockgower – New 50KVA Generator • Rosslare – New 50KVA Generator

**NAC Generator within project scope, but as not within RP3 scope ✂to be deducted from budget.

Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project delivers power supply resilience to NAC center and key Radar and VHF Communication sites. The generators at the NAC and several Radar sites are at end of life and the identified VHF Communication sites currently have no backup generator NAC – Replacement 100KVA Generator.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Invitation to Tender	Q1 2022
Contract signed	Q3 2022
Installation of generators	Q4 2022 -Q2 2023
Capitalise Project	Q4 2023

Deliverables

1. NAC – Replacement 100KVA Generator.
2. Dooncarton - Replacement 60KVA Generator
3. Woodcock Hill Radar - Replacement 60KVA Generator
4. Shannon Radar - Replacement 60KVA Generator
5. Mt Gabriel Head 1 Radar - Replacement 60KVA Generator
6. Mt Gabriel Head 2 Radar - Replacement 60KVA Generator
7. Knockgower – New 50KVA Generator
8. Rosslare – New 50KVA Generator

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Dooncarton - Replacement 60KVA Gen	✂	✂
Wood Hill Radar - Replacement 60KVA Gen	✂	✂
Shannon Radar - Replacement 60KVA Gen	✂	✂
MG H1 - Replacement 60KVA Gen	✂	✂
MG H2 - Replacement 60KVA Gen	✂	✂
Knockgower – New 50KVA Gen	✂	✂
Rosslare – New 50KVA Gen	✂	✂
Total	✂	✂

Key Information / Benefits

The outcome of this project will be beneficial to the IAA En Route and NAC centers by ensuring that M&E power services supporting business-critical Radar, VHF and HF communications will be maintained at these sites.

National Radar Upgrades

Project Summary

IAA Commissioned 8 Radars between 2005 and 2011 and as these Radars are at end of life, this project covers the cost of upgrading the Radars to extend their life by at least 5 years. In order to reduce spending, full Radar replacement during the RP3 period is not being proposed.

Project Details Summary	This project will ensure that the IAA has sufficient, reliable and accurate surveillance coverage of Irish Airspace in order to maintain 5NM (Nautical Mile) and 3NM horizontal separation of Aircraft, in the IAAs En-Route and Dublin Terminal airspaces respectively. Eight of the existing IAA Radar systems were installed between 2005 and 2011 and many components are at end of life. A number of Radar subsystems, such as radar antennae and ancillaries which have not degraded or have been upgraded may be retained, facilitating a more cost-effective Radar upgrade rather than Radar replacement during this RP3 period. It is proposed that two radars per year be upgraded. This will see 4 radars upgraded during RP3 period and 4 further Radars updated during RP4. The order of the radar upgrades will be determined by operational & technical priority.
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project will ensure that four IAA radars will be upgraded during the RP3 period, ensuring IAA has sufficient, reliable and accurate surveillance coverage of IAA Airspace in order to maintain 5NM and 3NM horizontal separation of Aircraft
Asset life	12 years

Project Delivery Key Milestones

Milestone	Completion date
Priority 1 & 2, Radar Upgrades	Q4 2023
Capitalise Priority Radars 1&2	Q4 2023
Priority 3 & 4, Radar Upgrades	Q4 2024
Capitalise Priority Radars 3&4	Q4 2024

Deliverables

Six IAA Radars will be upgraded to extend their operational life to ✂

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Priority 1 & 2, Radar Upgrades	✂	✂
Priority 3 & 4, Radar Upgrades	✂	✂
Total	✂	✂

*✂

Key Information / Benefits

- This National Radar Upgrade project addresses the current Radar obsolescence problem, with a cost-effective solution which delivers resilient Surveillance Coverage, by extending the life of each upgraded Radar.

PSR 2.6GHz Safeguarding

Project Summary

This project will ensure that IAA's Primary Radars (PSR) are not impacted by use of the 2.6GHz band for mobile telephony and IAA safety standards will be maintained.

Project Details Summary	Filters must be installed, and radar frequency changes must be applied on PSR Radars to ensure compatibility with mobile communications utilizing the 2.6 GHz band to prevent Radar interference. IAA Primary Radars at Dublin, Cork and Shannon airports fall into this category and therefore require filters and frequency changes to avoid interference to essential IAA services, and related operational and safety issues. ✂
Category	RP3- Technology Terminal
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	Additional annual utilities costs – no change Maintenance of systems - No additional costs Additional headcount impacts – no change
Project Output	✂
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Shannon Radar - Frequency change and filter installation	Q3 2021
Cork Radar - Frequency change and filter installation	Q4 2021
Capitalise Cork & Shannon ✂	Q4 2021
Dublin Radar 3 - Frequency change and filter installation	Q1 2022
Capitalise Dublin ✂	Q1 2022

Deliverables

1. Shannon Radar - Frequency change and filter installation Q3 2021
2. Cork Radar - Frequency change and filter installation Q4 2021
3. Dublin Radar 3 - Frequency change and filter installation Q1 2022
4. Decommission Dublin Radar 2 Q3 2022

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
✂ Contract for Radar Frequency changes and filter installations	✂	✂
Total	✂	✂

✂

Key Information / Benefits

- The main benefit from this project lies in the protection of IAA Radar operations and safety requirements as well as the cost neutral aspect since IAA is to be reimbursed for its costs.
- The IAA is also supporting the commercialisation of the 2.6 GHz spectrum which the state will benefit from through the auction of the multi-band spectrum which enables the roll out of nationwide 5G mobile services. ComReg currently estimates the value of the spectrum at ✂

Radar Site UPS Replacement

Project Summary

The Radar Site and Shannon Tower UPS systems installed between 2005-2011 were at end of life. This project provided for the replacement of obsolete UPS systems with dual redundant UPS systems with additional battery backup to improve Radar availability and resilience to mains power failures.

Project Details Summary	This project provided for the replacement of the obsolete UPS systems with dual redundant UPS systems with additional battery backup to improve Radar availability and resilience to mains power failures. The UPS systems at the following sites were replaced. 1. Mt Gabriel Head 1 Radar. 2019 2. Mt Gabriel Head 2 Radar. 2019 3. Dooncarton Radar. 2019 4. Malin head Radar. 2019 5. Cork Radar. 2020 6. Shannon Radar. 2020 7. Shannon Control Tower 2020 8. Woodcock Hill Radar. 2020
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project provided for the replacement of the obsolete UPS systems with dual redundant UPS systems with additional battery backup to improve Radar availability and resilience to mains power failures. This also removed business continuity risks at the Radar sites which could affect En-Route and terminal ATS services.
Asset life	8 years

Project Delivery Key Milestones		
	Milestone	**Completion date**
1.	Mt Gabriel Head 1 Radar.	2019
2.	Mt Gabriel Head 2 Radar.	2019
3.	Dooncarton Radar.	2019
4.	Malin head Radar.	2019
5.	Cork Radar.	2020
6.	Shannon Radar.	2020
7.	Shannon Control Tower	2020
8.	Woodcock Hill Radar.	2020
	Capitalise Project T024	Q4 2020

Deliverables

- New dual redundant UPS systems with 10 hours battery backup at the following sites:
- Mt Gabriel Head 1 Radar, Mt Gabriel Head 2 Radar, Dooncarton Radar, Malin head Radar, Cork Radar, Shannon Radar, Shannon Control Tower, Woodcock Hill Radar.

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Six Radar sites at ✂ Radar	✂	✂
Dooncarton radar site at ✂ (additional UPS relocation works required)	✂	✂
Shannon Control Tower ✂	✂	✂
Total	✂	✂

Key Information / Benefits

This project has addressed the obsolescence of the power supplies at our radar sites, Malin, Dooncarton, Woodcock Hill, Shannon, Cork, Mt Gabriel 1 and Mt Gabriel 2 and the Shannon Control tower. It has delivered Dual UPS redundancy and 10 hours battery backup at all sites, which were originally single UPS with 4 hours battery back-up.

Remote Power Management

Project Summary

This Project is to install a system of monitoring of power systems at remote IAA sites.

Project Details Summary	This project is to deliver independent remote power monitoring of up to 20 sites, to provide detailed and unambiguous logging and reporting of power related faults at remote sites. The remote power monitoring will enable the relevant TCD to know where in the power chain a fault has occurred, allowing for the correct support services, mains supplier, UPS or Generator contractors, to be contacted
Category	RP3- Technology En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	Remote Power monitoring system PC for graphical presentation of alerts & interface logs at Ballycasey and Dublin TCDs. Cisco based fixed IP 4G VPN services between TCDs and monitored sites. Remote power monitoring meters for Mains, Generator and UPS at each site.
Asset life	8 years

Milestone	**Completion date**
BCY TCD Remote Power monitoring system PC.	Q4 2018.
6 x Priority remote sites completed	Q4 2018
Dublin TCD Remote Power monitoring system PC.	Q4 2023*
14 x Remote sites Completed	Q4 2023*
Capitalise Project R012	Q4 2023

✂

Deliverables

- Installation of remote power monitoring meters for Mains, Generator and UPS at 20 sites.
- Installation of Cisco based fixed IP 4G VPN services between ATCCs and all monitored sites.
- BCY TCD Remote Power monitoring system PC
- BCY Dublin TCD Remote Power monitoring system PC

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
20 x Remote site monitoring systems	✂	✂
2 x New TCD RPM systems	✂	✂
20 x Remote switchboard mods & installations	✂	✂
Total	✂	✂

Key Information / Benefits

- Provide detailed and unambiguous logging and reporting of power related faults at remote sites.
- Enable TCD to know where in the power chain a fault has occurred, allowing for the correct support services to be contacted.
- Provide an infrastructure for the potential future addition of more building management sensors to enable alerting of leaks, temperature issues, etc.
- Enable TCD engineers to assess the status of ESB outages and restorations relating to IAA remote sites in real time.

Shannon Tower Generator Replacement

Project Summary

This project replaces the ✂ supporting the Shannon Control tower and the systems and services transiting through the Shannon Tower to the En Route centre in Ballycasey

Project Details Summary	This project replaces ✂ supporting the Shannon Control tower and the systems and services transiting through the Shannon Tower to the En Route centre in Ballycasey. It is proposed to replace the 2 existing old 400 KVA generators which are end of life with 2 x 150 KVA generators. The Generator capacity can be reduced as these generators no longer support the En Route ATCC which was moved to Ballycasey in 2001
.	
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	Replacement of the two ✂ 400KVA generators which are end of life with two new 150 KVA generators.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Invitation to Tender	Q2 2021
Contract signed	Q3 2021
Installation of generators	Q4 2021
Capitalise Project U010	Q1 2022

Deliverables

- Decommission two 400KVA generators.
- Commission 2 x 100KVA generators, and associated cabling and control systems.

Key Information / Benefits

The outcome of this project will be beneficial to the IAA Shannon Control tower, Shannon Airport and Ballycasey En-Route center supporting business-critical ATM systems, by providing redundant backup generator power during prolonged mains failures.

Terrestrial ADS-B

Project Summary

This project is to improve the IAA's Surveillance infrastructure by adding Automatic Dependant Surveillance – Broadcast (ADS-B) sensors to our Radar sensor coverage. ADS-B has the potential to deliver surveillance data which is more accurate and cost effective compared to Radar.

Project Details Summary	This project is to improve the IAA's Surveillance infrastructure by adding ADS-B sensors to our Radar sensor coverage. Use of ADS-B in Radar separated airspace is completely dependent on the commercial aircraft fleet equipage with the required ADS-B transponder. This project was initiated in 2013 in line with the proposed fleet equipage mandate set out in EU 1207/2011, however the ADS-B mandate has been subsequently deferred twice and the ADS-B mandate only came into force on 7 Dec 2020 with the latest European equipage level measured at 82% in November 2020. Dual ADS-B sensors have been installed at Glencolmbkille to cover NOTA at Mt Gabriel to cover the SOTA and in Dublin to support Dublin TMA. ADS-B data servers have been installed in Ballycasey and CEROC En-Route centres to process and merge the ADS-B surveillance data from the three Sensors. ADS-B can be introduced into operation once the surveillance performance analysis verifies its surveillance
.	
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project is to improve the IAA's Surveillance infrastructure by adding ADS-B sensors to improve our Radar sensor coverage by adding accuracy and improved frequency of position updates
Asset life	8 years

Project Delivery Key Milestones

	Milestone		Completion date
•	Dual ADS-B sensors in Glencolmbkille, Co. Donegal.		2015
•	Dual ADS-B sensors in Mt Gabriel, Co. Cork.		2015
•	Dual ADS-B sensors in Dublin Airport.	2015	
•	ADS-B data servers in Ballycasey.		2018
•	ADS-B data servers in CEROC.	2020	
•	ADS-B Mandate in Force.		7/12/2020
•	>97% Commercial Fleet ADS-B equipped.		(82% Nov 2020)
•	ADS-B evaluation meets ESASSP 5NM requirements		Q4 2021
•	ADS-B Safety case approved by Regulator.		Q2 2022
•	Capitalise Project K010		Q3 2022

Deliverables

- Dual ADS-B sensors in Glencolmbkille, Co. Donegal.
- Dual ADS-B sensors in Mt Gabriel, Co. Cork.
- Dual ADS-B sensors in Dublin Airport.
- ADS-B data servers in Ballycasey.
- ADS-B data servers in CEROC.
- ADS-B Safety case for use in 5NM airspace approved by Regulator.

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
3x dual sensors & 2x ADS-B processing New Mode-S Radar	✂	✂
Total	✂	✂

Key Information / Benefits

- This project is to improve the IAA's Surveillance infrastructure by adding ADS-B sensors to improve our Radar sensor coverage by adding accuracy and improved frequency of position updates.

- Terrestrial ADS-B is to be compared with Space Based ADS-B and radar performance (Aireon Project Q002) which will enable the IAA to optimize the safety, performance and cost effectiveness of the IAAs Surveillance coverage infrastructure.

Dublin and Ballycasey ATCC UPS Replacements

Project Summary

The Dublin and Shannon Air Traffic Control Centre (ATCC) UPS systems are at end of life. This project is to provide for the replacement of these UPS systems which support all the essential ATM systems ✂ in the event of simultaneous mains and generator failures

Project Details Summary	This project is to provide for the replacement of the Dublin and Ballycasey UPS systems which support all the essential ATM systems ✂ in the event of simultaneous mains and generator failures. Existing redundant UPS Systems and batteries will be decommissioned in turn ensuring one UPS continues to support systems throughout the decommissioning and replacement.
.	
Category	RP3- Technology Terminal & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs have been constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	The obsolete ATCC UPS systems in Dublin and Ballycasey are to be replaced with new systems and new batteries to support the ATM systems during power failures.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Contract awarded	2020
Dublin ATCC UPSs Replaced.	Q2 2021
Ballycasey ATCC UPSs Replaced	Q3 2021
Capitalise Project S012	Q3 2021

Deliverables

Dublin

- 2 x 40kVA 3/3 UPS, with a separate bypass input, and a 45 min. battery at 20 kVA (20kW)
- 4 x 30kVA1/1 UPS, with a separate bypass input, and a 45 min. battery at 20 kVA (20kW)
- 3 x Cabling – All a.c., d.c., signal, and earth – between Sub Boards / UPSs / Bypass Boards
- 3 x System Bypass boards, one per UPS pair

Ballycasey

- 2 x 40 kVA 3/3 UPS, with a separate bypass input, and a 45 min. battery at 20 kVA (20kW)

- 4 x 30 kVA 1/1 UPS, with a separate bypass input, and a 45 min. battery at 20 kVA (20kW)
- 2 x 30 kVA 1/1 UPS, with a separate bypass input, and a 45 min. battery at 20 KVa (20kW)
- 4 x Cabling – All a.c., d.c., signal, and earth – between Sub Boards / UPSs / Bypass Boards
- 4 no. System Bypass boards, one per UPS pair

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Dublin ATCC UPSs	✂	✂
Ballycasey ATCC UPSs	✂	✂
Commissioning and Decommissioning	✂	✂
Total	✂	✂

Key Information / Benefits

- The ATM systems in Dublin and Ballycasey ATCC will be supported for 90 minutes in the event of simultaneous mains and generator failures.
- Mains failures will have no impact on ATC systems in Ballycasey and Dublin as the UPS systems will support all essential systems in the interim before the generators provide the power.

Urlanmore and Woodcock Hill Rx Site Generators

Project Summary

This project delivers power supply resilience to key IAA communication sites in Urlanmore and Woodcock Hill, by installing a Generator to Back up the VHF comms site in Woodcock Hill and by installing two new generators in Urlanmore HF Transmitter site.

Project Details Summary	This project delivers power supply resilience to key IAA communication sites in Urlanmore** and Woodcock Hill. The power requirements in Urlanmore are such that it is not possible to support the site with a UPS System and all NAC transmitters are currently supported by a single Generator. The proposal at Urlanmore is to purchase and install 2 x generators, one to ✂ and the second to add resilient back-up for critical NAC operations. Woodcock Hill Receiver site (building no. 3) has no generator power supply back up. A new generator is required to provide power supply resilience at this business-critical site. The key benefit of the project will be to prevent interruptions to business-critical and safety-critical communications systems and close the Safety Recommendation, ✂

**NAC Urlanmore Generators within project scope, but as not within RP3 scope ✂ can be deducted from budget.

Category	RP3- Technology NAC & En-Route services
Primary Driver	Safety
Secondary Driver	Business continuity
Total Capex Requirement	✂

Assumptions/Cost Benchmarks	Costs have constructed using estimates provided by experienced vendors.
OPEX Impacts	✂
Project Output	This project delivers power supply resilience to key IAA communication sites in Urlanmore and Woodcock Hill, to improve our Business continuity infrastructure.
Asset life	8 years

Project Delivery Key Milestones

Milestone	Completion date
Invitation to Tender	Q2 2021
Contract signed	Q3 2021
Installation of generators	Q4 2021
Capitalise Project T004	Q1 2022

Deliverables

1. Woodcock Hill - 50KVA generator, generator container and cabling and control systems.
2. Urlanmore, 2 x 350KVA generators, and cabling and control systems.

Level 1 Cost Analysis

Cost Analysis	Represents (%)	Total €
Urlanmore Generators	✂	✂
Woodcock Hill Generator	✂	✂
Total	✂	✂

✂

New Tower Parallel Runway Project (NTPR)

Project Summary

Provision of an air traffic service to the new north runway at Dublin airport, including a new control tower, ground infrastructure and ATM systems.

Project Details Summary	The This project is triggered by the decision of the daa to construct a new parallel runway, the North Runway, at Dublin airport. In order to provide an air traffic service to this runway, the IAA is required to make investments in a new control tower, ground infrastructure and in ATM systems. Having considered a number of options, the most cost-effective solution, which is capable of delivering within the timeframe necessary, is the construction of a new visual control tower. Therefore, the project addresses the following: • Infrastructure, systems, airspace design and procedures to support a parallel runway operation; and • A new air traffic control tower, driven by ICAO safety requirements that require air traffic controllers to have visibility of the full extent of both runways. **Background** In 2007, to accommodate forecast growth in passenger demand, the Dublin Airport Authority announced that a second (parallel) runway would be built at Dublin Airport, along with additional taxiways, enhanced rapid exit taxiways and a larger and significantly enhanced apron infrastructure. This new infrastructure, including the second runway, was expected to be operational by the end of 2012. The airport expansion was eventually put on hold by the daa following the collapse of the Irish economy, the global financial crash, the slowdown in global economic activity and the consequent decline in passenger numbers. In 2015, driven by the recovery in the economy, passengers using Dublin airport exceeded 25 million per annum, a level at which the Commission for Aviation Regulation (CAR), in its 2014 determination on the maximum level of airport charges at Dublin Airport, set as a threshold for the daa permission to build a second runway, known as the North Runway.
Category	RP3- Technology Terminal ATC services
Primary Driver	daa North Runway construction
Secondary Driver	Facilitate future growth
Total Capex Requirement	✂
Assumptions/Cost Benchmarks	Costs based on contract award price The height of the tower (86.9 metres) is consistent with towers at other airports with parallel runway operations including Stockholm (83 metres) and Istanbul (95 metres).
OPEX Impacts	✂

✂

Training costs – ATCO and Engineers

ATCO training cover 3 main areas as follows:

✂

Asset life	Tower building 20 years. Systems 8 years

Project Delivery Key Milestones

Milestone	Completion date
Refresh of Design Stage	Q2 2016
Tendering	Q4 2016
Airspace Procedures Design	Q3 2020
Safety Assessment	Q2 2021
Construction of Tower	Q3 2018
Fit Out of Tower	Q4 2020
Recruitment	Q2 2018
Training Q4 2020	
Operational Capability (single runway current airspace)	Q3 2021
Operational Capability (single runway new airspace)	Q4 2021
Operational Capability (dual runway) *	Q3 2022

* subject to daa North Runway project completion

Deliverables

- Construction of Tower plus ancillaries
- Parallel Runway Operations and Fit-Out of Tower

	2018	2017	2016	2015	2014
Dublin (M PAX)	31.5	29.6	27.9	25	21.7
Percentage change year-on-year	+6.5%	+6.0%	+11.4%	+15.4%	+7.7%

Dublin Airport passenger Five-year summary (source: daa)

It is proposed that the parallel runway operations and new control tower will be operational before end of 2021.

1. The IAA received planning permission for the construction of a new visual control tower, 86.9 metres in height. Deliverables include the following:

- A new visual control tower with an elevation of 86.9 metres
- A single storey over-basement building of 907 square metres
- A security hut, 37 square metres
- 126 car parking spaces
- Associated site works, landscaping service connections
- The delivery of the UPS, generator, cable trays and all the mechanical and electrical installation are included in the building phase.

2. Effective and reliable ATM system and other systems are essential to the provision of safe and efficient air traffic control services from the new visual control tower. This is achieved in the fit-out phase with the following key installations:

-The visual control tower is equipped with 12 ATC controller working positions to provide for north and south runway control, apron control clearance delivery services and flight data assistant support services. A tower coordinator position is also installed. The 12 controller working positions provide redundancy in the event of a failure of a specific position.

Each working position will have access to:
An Integrated ATC Suite (I-ATS) which combine

- the runways and the implementation of A-CDM (Airport Collaborative Decision Making) and departure management with the daa,
- the Area Surface Movement Guidance Control (ASMGCS) system for the display of positional information for aircraft approaching and on the aerodrome;
- Voice communications system for the management of air to ground and ground to ground communications;
- A redundant back-up communications system for the provision of air to ground and ground to ground services;
- Telephones and Navaids status displays;
- All of the tower systems will be integrated into the IAA's centralised monitoring system.
- In support to the new tower and parallel runway, additional project works are required as follow:
    - Runway fit-out – the parallel runway requires 2 full ILS (Instrument Landing System e.g. localiser, glidepath and distance measuring equipment) installation with an associated IRVR
    - Additional multilateration (MLAT) receiver sites to provide coverage of the North Runway for ASMGCS system and daa systems.
    - Ancillary ducting and airfield interfaces to facilitate the new runway and to migrate the existing services from the surveillance and communication sites to the control building and tower.

Level 1 Cost Analysis

✂

Key Information

This project is of strategic national importance. As an island nation Ireland relies heavily on air connectivity to sustain and grow the economy. The project therefore aligns with the national aviation transport plan (National Aviation Policy Second Progress Report, Feb 2019, p. 22).
The project budget assumes all costs of tower fit-out including technology fit-out, business ICT hardware, software and enabling works as well as furniture and fittings.
Cost based on daa owned site.

- Type of structure: Fire resistive infrastructure construction
- Based on tendered price
- Work carried out landside.

Benefits
When resuming air traffic comparable to forecasted growth, using just a single runway operation, demand is expected to exceed capacity thereby limiting growth at the airport. Delays, solely associated with this excess demand, are expected to increase by up to an additional 25 minutes per aircraft movement.
The parallel runway addresses this capacity constraint and facilitate future growth, to the benefit not just of the airport but to the wider economy in terms of employment in aviation and aviation-related sectors as well as Ireland's tourism sector.
The benefits of this programme are as follow:

- Accommodate future growth needs
- Retirement of obsolete infrastructure & replacement with up to date platform
- Enhanced ATC functionality & capability

Appendix 4 Cost Containment

Prepared on 7 January 2021 and subsequently published online – it was updated in June ahead of the RP3 consultation.

This document has been prepared by the Irish Aviation Authority's Air Navigation Service Provider (IAA ANSP) in response to a request from the Commission for Aviation Regulation (CAR). It details the cost containment measures taken, and planned, by IAA ANSP as a result of the COVID-19 pandemic. It has been developed in the context of the significant uncertainty and volatility that existed throughout 2020 with regard to the impact of the pandemic on society, public health, business and the aviation sector, and which continues to exist with regard to planning uncertainty in 2021. It is highlighted that the pandemic struck before a 5-year regulatory plan was finalised for the IAA. The IAA's en-route and terminal revenues collapsed with a 90% reduction in air traffic levels in Ireland in April 2020; however, the IAA has been required under statute to ensure the provision of a full safe, efficient and high-quality service to its customers. In addition, like many businesses in Ireland, the IAA has had to make significant investments to protect the health of its staff while other initiatives such as unconventional rostering in addition to contingency provisions to manage the crisis also impact on cost savings. While it is clear at this point that the pandemic has been longer lasting and had deeper damaging impacts on aviation than many had initially predicted, IAA ANSP has had to continue to maintain readiness for a recovery, in order to ensure that there is no loss of safety or quality of service once air traffic levels start to increase.

1. IAA ANSP Report on actions taken as a result of the COVID-19 Pandemic

1. Pursuant to Article 6(1) of Implementing Regulation (EU) 2020/1627, European air navigation service providers (ANSPs) were required to submit a report to their National Supervisory Authority (NSA) detailing the measures put in place in order to address the financial and operational impact of the COVID-19 pandemic on its activities. Specifically, ANSPs were required to quantify the impact of actions taken as a result of the pandemic compared to the original Draft RP3 Plans of November 2019.

2. In November 2020, the PRB circulated a pre-filled Excel template on the additional monitoring and reporting for Ireland in which it sought quantitative and qualitative information regarding the impact of any actions taken or planned for RP3 as a result of the Covid-19 pandemic and in comparison to the draft Performance Plan submitted in November 2019. The PRB stated it was interested in actions covering both measures introduced to respond to traffic decrease and recovery measures.

3. The IAA ANSP therefore completed the pre-filled templates for 2020 and 2021, and CAR subsequently submitted the tables to the PRB on 15 December 2020.

4. It is important to note that this report complements the PRB's pre-filled Excel template that is required under EU Regulation 2020/1627 by providing further information on the cost containment measures that were undertaken by IAA ANSP. It is the case that cost containment has typically been implemented on a Company-wide basis to date. Appendix 1, however, reports the effect of these cost containment measures on IAA ANSP's en route and terminal businesses only.

5. Since the end of March 2020, the IAA ensured there has been a particularly strong focus on cost containment with all non-essential expenditure being deferred in order to preserve the Company's cash position.

6. The cost containment actions of the IAA were implemented in consultation with Staff Panel representatives and since March 2020 it has been the Company's intention to take a phased and considered approach to implementing cost avoidance and cost containment measures.

7. Phase 1 focused on cost avoidance and commenced in March 2020. Phase 2 was subsequently implemented in July 2020 and involved a reduced working week for most staff. Cost Containment Phase 3 commenced on 8 January 2021 and will remain in place until 6 January 2022. The temporary payroll reduction measures bring pay levels for all staff back to 2011 levels, effectively wiping out the general round increases of 6% which were paid under RP2 under the CLA 2015 – 2019. Some senior staff have been subject to a reduction in pay by 30%.

2. Background

8. During RP2, traffic was much higher than forecast and through a reliance on overtime and other measures, IAA ANSP met the various performance targets, but it was clear that further recruitment was required in the RP3 period. The original RP3 Plan endorsed by the NSA and State was based on maintaining service quality levels, business sustainability and ensuring capex commitments were delivered. In addition, IAA ANSP remained highly efficient entering this crisis with one of the lowest unit rates in Europe.

9. The IAA established a Coronavirus Taskforce in February 2020 and as the month unfolded, it was clear that the traffic outlook was rapidly deteriorating. Nevertheless, traffic in the first two months of 2020 remained largely intact and it was not until March 2020 when the impact of the pandemic began to affect the traffic handled by the IAA. The Company's objective right from the start of the crisis was to protect staff and maintain safety and service levels to customers.

10. While the full effects of the decline in traffic had not yet materialized, the IAA implemented the first phase of its cost containment programme, detailed in Section 3 below.

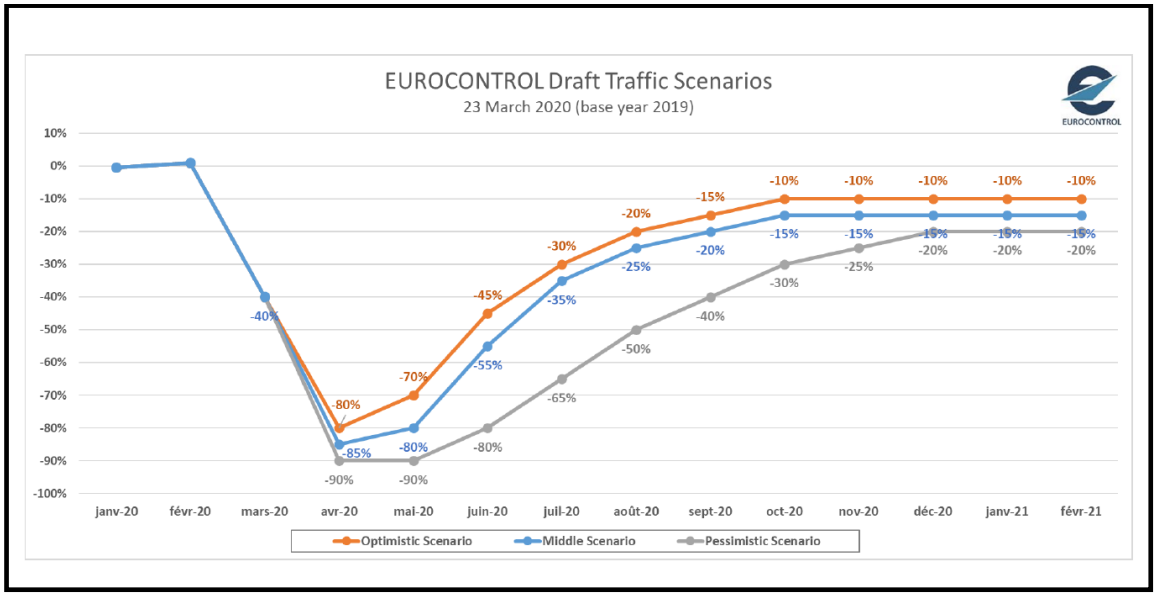
11. It is important to note that from the beginning of the pandemic, the crisis was first and foremost a health crisis even though it was soon to also become a financial crisis. To provide some context, there was one instance, for example, in the US on 18 March 2020 where more than 100 flights were cancelled at McCarran International Airport due to a shutdown that was triggered when an air traffic controller tested positive for COVID-19. The Federal Aviation Administration (FAA) ordered the air traffic control tower to temporarily shut down in order to ensure a safe work environment for controllers and technicians, and the backup system had limited capacity and resulted in cancelled flights. It was not known at the time when the tower would reopen, and it remained closed the following afternoon as the FAA sought to determine how many other controllers would have to self-isolate.

12. The IAA followed best practice policies that ensured the airspace remained open and full services were provided throughout the pandemic.

13. On 20 March 2020, EUROCONTROL distributed a report titled "Chinese Flight Recovery" which showed that flights in China had doubled in 4 weeks since the peak infection rate mid-

February. It further noted in this publication that the recovery in Europe might start at the end of April or mid-May 2020.

Figure 23 Draft Traffic Scenarios by EUROCONTROL as of 23 March 2020



14. As the situation deteriorated in April 2020, the industry was focused on ensuring continuity in the aviation global supply chain.

15. IAA ANSP had to act fast to preserve business stability throughout the unfolding liquidity crisis and in the absence of a reliable traffic forecast, it was necessary to maintain service levels albeit with lower traffic. It was only possible to do this by using the IAA's cash reserves, established through prudent management over a number of years. This was an appropriate use of these reserves, maintaining service levels and safety for customers through the pandemic, rather than reducing service levels in order to further cut costs. The absence of a final RP3 Plan and further uncertainty surrounding amendments to the regulation further complicated the environment. IAA ANSP also ensured that required investments took place in order to protect staff (including appropriate screens, optimal rostering, tiger teams, general screening, staff availability in the event of other staff becoming unavailable due to the virus) and planning for an eventual recovery.

16. As IAA ANSP is obliged by statute to keep the skies open and maintain a safe and effective service, and an awareness of the challenges of an eventual recovery has been important. In other words, while costs have been contained appropriately during the pandemic, it has been important that cuts do not hamper the IAA's ability to provide service in future years (e.g. by excessive staff cuts, lack of investment or inability to ramp-up as required when the recovery takes place). In this context, the nature of our business is a key consideration given the specialist staff required, the length of time required to train staff in addition to the various licensing requirements (continuity of service, maintaining rating etc.) – all of which require a considerable time period, thereby contributes to the fixed nature of our costs.

17. There is also a high level of other fixed costs in the business and requirement to continue with maintenance and investment plans – certain projects had to advance irrespective of the pandemic and unfolding liquidity crisis. Regulatory costs are also fixed and increasing as a

result of Regulation 373/2017 and other regulatory requirements, which had been reflected in the original RP3 Plan and these costs have not been reduced due to the pandemic.

18. IAA ANSP maintained a full air traffic management service, while air navigation and terminal charges due from the airlines in respect of flights in February, March, April and May 2020 were deferred for payment in future months in order to provide some relief to our customers at that time.

19. Despite the high level of uncertainty over the short term that existed, IAA ANSP advanced plans for cost containment Phase 2 in consultation with staff representatives, as set out in Section 4. IAA ANSP subsequently advanced the next phase of cost containment – Phase 3 – which commenced on 8 January 2021 and is expected to remain in place for a period of 12 months to 6 January 2022.

3. Cost Containment Phase 1 – implemented March 2020

20. **Moratorium on Recruitment and Promotions**

Within the ANSP recruitment has taken place for specific and limited positions where a business need was identified e.g. Engineering – due to the long lead in time from recruitment to experienced engineer a graduate engineering programme will commence in Q3 2021. Further examples include HR – two positions vacated in March and December 2020 only one position filled in May 2021 and Head of Safety Management Unit, which is a safety critical role filled in Q2 2021.

21. **General Pay Increase**

Planned general pay increases for both 2020 and 2021 were cancelled. These savings are permanent cost savings. However, it was agreed with the Staff Panel that discussions would continue with a view to concluding a revision to the 2015 Collective Labour Agreements (CLA) as a matter of priority.

✂

22. **Accrued leave**

Staff who had been carrying accrued days from 2019 in excess of 5 days had to take the accrued days between 1 April 2020 and 30 June 2020 to reduce accrued leave to a maximum of 5 days, and where operationally possible all accrued leave was to be burned off.

23. **Annual Leave**

In addition, all staff were required to burn off annual leave of between 8-10 days by the end of May 2020, in consultation with their line manager.

24. **Training**

All non-essential technical and soft skills training ceased.

25. **Capital Projects**

A fundamental review of all capital project activity was initiated, and it was agreed that projects would be deferred or closed unless critical to operations.

26. **Other Staff-Related Measures**

In addition to the foregoing measures, the Company sought expressions of interest from staff to the following options:

- Unpaid Leave
- Job Sharing
- Career Breaks

13 operational staff opted for job sharing (50% reduction in working hours) between November 2020 to April 2021. A further 13 staff have opted for reduced working hours of between 12.5% to 50% of working hours for periods of between 6 and 12 months in 2021.

27. **Other Cost Savings**
A review of all other operating costs was undertaken to defer/cancel non-essential expenditure in light of the pandemic and associated traffic downturn. Naturally, travel costs and overtime costs were reduced as a direct result of travel restrictions and reduced traffic levels.

4. Cost Containment Phase 2 – implemented July 2020

28. With the introduction of Phase 2 in July 2020, it is important to note that Phase 1 measures remained in place.

29. Under Phase 2, a company-wide 4.5 day working week was implemented, affecting all IAA staff earning in excess of €38,500 per annum.

30. Despite the implementation of Phase 2, many non-operational staff and frontline engineers continued to work in excess the 4.5 day working week, as required.

31. As part of Phase 2, IAA Management sought agreement from staff who can retire with pension entitlements in 2020 to do so. In addition to this, 26 staff who were within two years of qualifying for pension benefits were offered the option of retiring early and becoming deferred members of their pension scheme. As these represented voluntary options, they were not considered to be as reliable in terms of a cost reduction measure.

32. ✂

5. Cost Containment Phase 3 – implemented January 2021

33. Discussions with the trade unions on Phase 3 measures required the intervention of our internal dispute board. Following mediated discussions, agreement was reached on a temporary pay reduction throughout 2021, subject to an ongoing review of traffic developments, for example, and these proposals were successfully balloted for acceptance at the end of 2020.

34. Phase 3 measures has implemented a banded pay reduction of up to 10% for staff from 8 January 2021 until 6 January 2022 and achieve approximately €6m of a cost reduction.

35. More specifically, all ATCOs earning in excess of €38,500 per annum will incur a 10% reduction in salary. Non-ATCOs earning between €38,500-€56,930 will incur a 5% reduction, whereas non-ATCOs earning more than €56,930 will incur a 9.75% reduction.

36. In order to proceed with formal negotiations on Phase 3 cost containment measures, it was agreed that all staff would be restored to full salary at the Phase 2 expiry date of 29 October 2020. Therefore, while Phase 2 remained in place in November and December 2020, a subsequent adjustment is required to enable the Phase 3 measures to commence in January 2021 in line with the collective agreement.

6. Non-Cost Containment Reductions

37. The 2019 RP3 Plan had assumed that the regulatory reform process would be completed by 2020, which has not proved to be the case. There is, therefore, a considerable saving in 2020 compared to the original RP3 Plan, which is not related to the cost containment measures implemented in response to the pandemic.

38. The eligibility of the IAA to seek State supports in the form of the Temporary Wage Subsidy Scheme was minimal. The Company has, however, been availing of the Employment Wage Subsidy Scheme and these savings are being applied for the benefit of our customers.

7. New Cost Items

39. Certain costs have been incurred in 2020 that were not anticipated at the time of submitting the original RP3 Plan, including but not limited to higher pension related costs as a result of a funding proposal to 2024 approved by the Pensions Authority in May 2020.

40. It is also important to note that the cost containment measures implemented in 2020 have been partially offset by unanticipated costs directly related to the pandemic. These include, for example, costs required to provide sufficient PPE, costs required to ensure the operational facilities were regularly deep cleaned and costs associated with stocking the operational facilities with necessities should the operational team be required to stay within the facility for periods of up to three weeks per cycle as part of the contingency plans.

41. In relation to the VSS, the eventual uptake of 8 staff (en route and terminal) was approved by the Department of Transport to exit 31 May 2021. ✂

    VSS/VER – ATC uptake

    8 ATC: 6 ATCOs 1 SM and 1 HDA.

8. Adapting to the realities of the pandemic

42. The IAA ANSP rostering system was modified in order to keep staff segregated insofar as it was possible. It has been possible to minimise the number of teams coming into contact with each other by adopting an approach structured around pods – the reality of this approach, however, is that it has limited the amount of savings that could be generated above the cost containment phases detailed in Sections 3-5.

43. IAA ANSP has also had to have regard to policy statements from Europe, including the Director General of DG MOVE, Mr. Henrik Hololei, who stated at the TRAN Committee in June 2020 that there is no plan to deplete ANSPs of resources. Mr. Hololei stated that, to the contrary, ANSPs should get the necessary financial resources to get through the current downturn,

keeping up the services needed during this time and should be able to respond once the demand comes back.

44. Against this backdrop, it is important to note that ANSPs have had to plan against significant uncertainty. Following the publication of STATFOR scenario forecasts on 4 November 2020, for example, ANSPs were being advised to plan for Scenario 1 being the most optimistic recovery scenario by the Network Manager, while at the same time, the PRB was advising ANSPs to plan in accordance with Scenario 2 (the equivalent of a base case or mid scenario) for RP3 purposes. It is also worth noting that the Network Manager continues to request a 10% buffer in ANSP resourcing plans, with respect to the traffic demand outlook, in order to avoid sudden capacity problems. This level of uncertainty has constrained the Company's ability to achieve further cost containment measures despite the severity of the downturn.

45. It is also noted that there remains significant uncertainty and planning challenge; Ireland and much of Europe is now going through a third wave of COVID-19 infections, with further lockdowns and restrictions being imposed. The variant of COVID-19 identified initially in the UK in December 2020 has required a travel ban to be in place between Ireland and the UK from 20 December until 9 January 2021, with significant restrictions on travel thereafter. With such significant uncertainty around the trajectory of the virus and the pace of vaccine roll-out across Europe, the planning horizon remains difficult for the IAA.

9. Summary

46. IAA ANSP remains committed to maintaining a full service on its operations. Given the ongoing volatility with respect to the public health situation, IAA ANSP is ensuring that a safe service is available and that the Company is appropriately positioned to facilitate the recovery in air travel. A cost containment programme that went further than what has been achieved to date would have greatly compromised our ability to maintain a full service and ensure we are well placed to facilitate a recovery in line with the EUROCONTROL Scenarios of November 2020.

47. In summary, IAA ANSP remains committed to reviewing further cost containment measures beyond 2021 as required and in line with the recovery of its traffic. However, IAA ANSP has implemented a phased cost containment programme that is a necessary and temporary solution to ensure liquidity throughout the crisis and as traffic returns, necessary costs will be reinstated to achieve the required performance.

Appendix 5 Environmental Performance

1. IAA ANSP has achieved the second-best performance in Europe in relation to horizontal flight efficiency (HFE). There are basically no restrictions on HFE, i.e. via the RAD in Irish airspace. Any residual restrictions are due to constraints in neighbouring airspace, which are being addressed via the Borealis and other national Free route projects.

2. Enroute vertical flight efficiency is also very high. Flights basically get the flight level they request. (There is no performance indicator for this yet).

3. In the terminal area the reduction in traffic has reduced the additional taxi out and additional time spent in terminal area to near zero. Only Dublin had such additional times – traffic at Cork and Shannon was never high enough to have such delays. The new runway will ensure that these can remain very low throughout RP3 (some residual taxi out issues could occur at Dublin due to airport infrastructure constraints).

4. The ATM related impact on the environment is closely linked to operational performance (fuel efficiency) which is largely driven by inefficiencies in the flight trajectory and associated fuel burn (and emissions).

5. The core objective of this Environmental Report is to review Environmental Metrics and to provide baseline information to enable greater coordination, monitoring and improvement of IAA ATM Environmental Performance.

6. The following Environmental Performance indicators are examined in this section.
   a) Continuous Climb Operations (CCO)
   b) Continuous Descent Operations (CDO)
   c) Arrival Sequencing and Metering Area (ASMA)
   d) Airline Operator Performance at IAA Airports and Regional Airports
   e) Horizontal Flight Efficiency Indicators – KEP, KEA and KES
   f) IAA Environmental Metrics in the Borealis Alliance.

Continuous Climb Operations (CCO)

Continuous Climb Operations		Ireland 2019	Ireland 2020	Change
% of Continuous Climb Operations to ToC		82%	85.91%	+4.77%

Continuous Descent Operations (CDO)

Continuous Descent Operations		Ireland 2019	Ireland 2020	Change
% Fuel Continuous Descent Operations from ToD		31.81%	46.23%	+45.33%

Arrival Sequencing and Metering Area (ASMA)

Arrival Sequencing and Metering Area (ASMA)		Ireland 2019	Ireland 2020	Change
		3.11	1.26	-1.85

Results

a) Strong improvement at Dublin CDO Operations

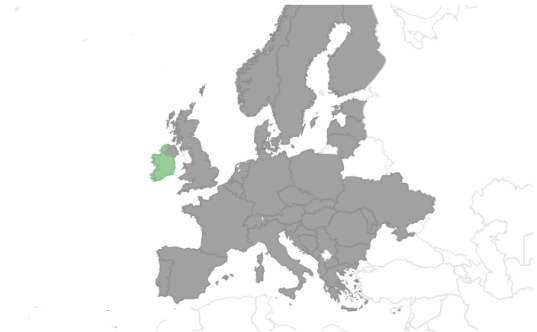
b) Ryanair outperforms all operators for CDO operations

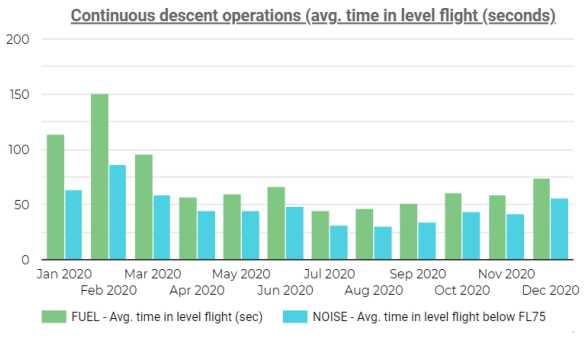
c) Borealis is the top performing alliance in Europe

d) Vertical Flight Efficiency Borealis Airports 4 of the Top 5 in Europe

Ireland Continuous Descent Operations

CDO - Continuous descent operations

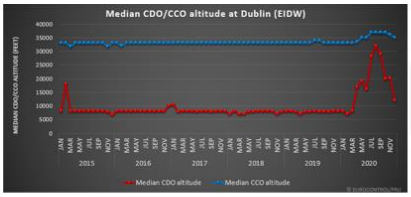




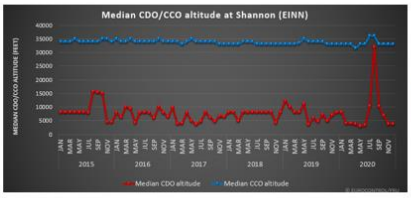
	Airport Name	State	Tot. descents	Tot. level time CDO (descents * sec.)	FUEL - Avg. time in level flight from ToD (sec)	FUEL - CDO from top of descent (%)	NOISE - Avg. time in level flight (sec) < FL75	NOISE - CDO below FL75 (%)
1.	Dublin (EIDW)	Ireland	43.18K	3.78M	87.6	46.0%	53.0	58.3%
2.	Shannon (EINN)	Ireland	4.44K	451.66K	101.7	42.5%	68.1	48.0%
3.	Cork (EICK)	Ireland	3.54K	340.25K	96.1	52.1%	63.0	59.7%

Continuous Descent Operations	Ireland	EIDW/Dublin	EINN/Shannon	EICK/Cork
% Fuel Continuous Descent Operations from ToD	46.23%	46.00%	42.50%	52.10%
Average Time in level flight from ToD (Sec)	90.17	87.6	101.7	96.1
Total level time Continuous Descent Operations (Descents*sec.)	4,403,697	3.78M	451.66K	340.25K
Noise -AVG Time in Level Flight (sec) <FL75		53.0	68.1	63
Noise -CDO below FL75 (%)		58.30%	48.00%	59.70%

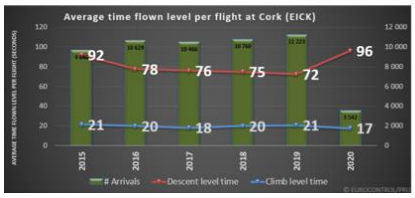
Arrival Sequencing and Metering Area (ASMA)	Ireland	EIDW/Dublin	EINN/Shannon	EICK/Cork
	1.26	1.32	N/A	0.37

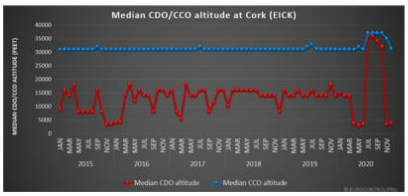


Strong improvement Descent 48%!
Improved descent levels



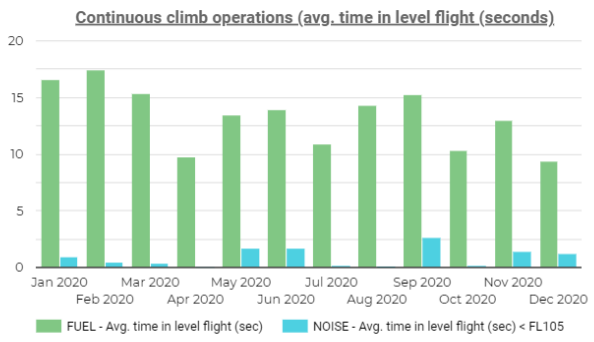
No improvement





No improvement

CCO - Continuous climb operations



	Airport Name	State	Tot. climbs	Tot. level time CCO (climbs * sec.)	FUEL - Avg. time in level flight to ToC (sec)	FUEL - CCO to top of climb (%)	NOISE - Avg. time in level flight (sec) < FL105	NOISE - CCO below FL105 (%)
1.	Dublin (EIDW)	Ireland	43.27K	611.36K	14.1	85.87%	0.3	99.3%
2.	Shannon (EINN)	Ireland	4.42K	74.78K	16.9	87.14%	1.6	98.7%
3.	Cork (EICK)	Ireland	3.56K	61.94K	17.4	86.81%	4.8	97.9%

Continuous Climb Operations	Ireland	EIDW/Dublin	EINN/Shannon	EICK/Cork
% of Continuous Climb Operations to ToC	85.91%	85.87%	87.14%	86.81%
Average time in level flight to ToC (seconds)	14.84	14.1	16.9	17.4
Total level time Continuous Climb Operations (Climbs*sec.)	726,116	611.36K	74.78K	61.94K
Noise - AVG Time in Level flight (sec) <FL105		0.3	1.6	4.8
Noise CCO below FL 105%		99.30%	98.70%	97.90%

✂

Horizontal Flight Efficiency

This section describes the Horizontal Flight Efficiency Indicators – KEP, KEA and KES.
The horizontal en-route flight efficiency indicator is computed for three different trajectories: (1) the actual flown trajectory **(KEA)**, (2) the planned trajectory according to the flight plan **(KEP)** and (3) the shortest constrained route provided by the Network Manager **(SCR)**.

The shortest constraint route (SCR) reflects the effect of the constraints imposed by ANSPs (route structure, airspace availability, etc.) on flight planning. It is not influenced by weather conditions or specific airline considerations, and it sets the limits within which the airlines can optimise.

Horizontal en-route inefficiencies impact in terms of fuel burn and emissions. The lower the efficiency, the higher the additional fuel consumption and emissions

In order to smooth out the influence of unusual events, in reporting annual values the ten best days and the ten worst days (for each measured area) will be excluded from the computation.

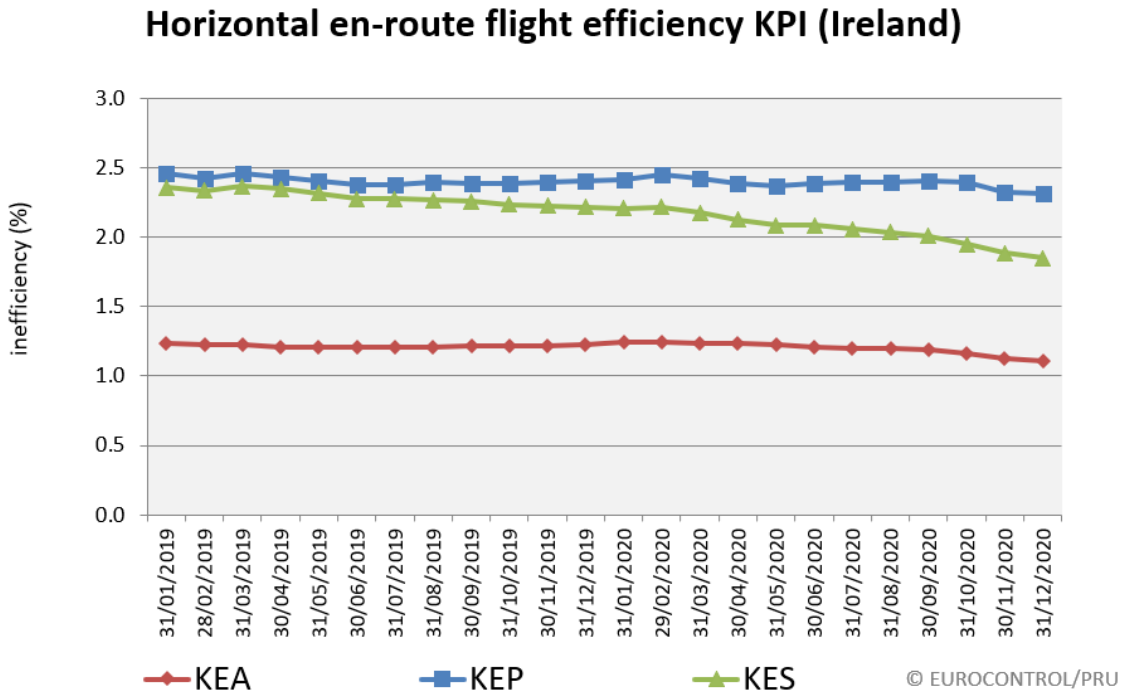
The indicator is used as part of the performance monitoring and reporting under:

a) SES: IR691/2010 (European Commission 2010) and IR390/2013 (European Commission 2013); and
b) EUROCONTROL: performance review reporting.

Ireland						
En-route flight efficiency (%)						
YEAR	2015	2016	2017	2018	2019	2020
Shortest Constrained Route	N/A	2.14%	2.36%	2.39%	2.21%	1.83%
Flight plan (KEP)	2.45%	2.66%	2.70%	2.49%	2.40%	2.28%
Actual trajectory (KEA)	1.30%	1.40%	1.35%	1.26%	1.24%	1.11

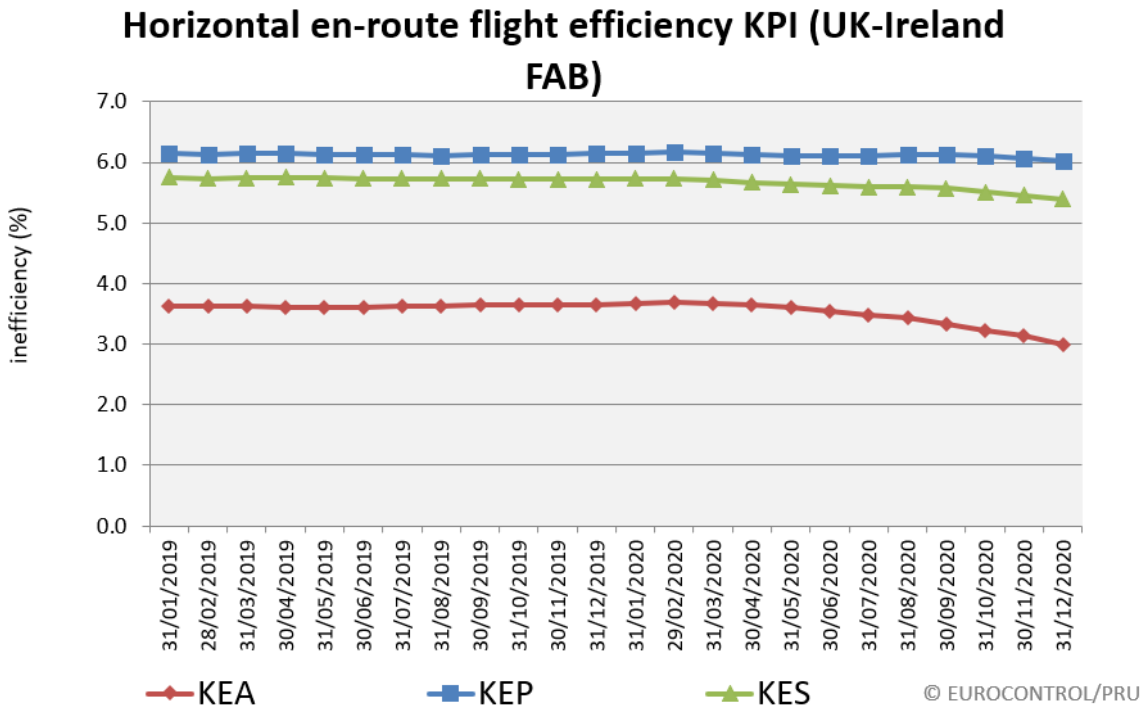
UK Ireland FAB						
En-route flight efficiency (%)						
YEAR	2015	2016	2017	2018	2019	2020
Flight plan (KEP)	5.95%	6.45%	6.27%	6.16%	6.15%	5.70%
Actual trajectory (KEA)	3.48%	3.87%	3.71%	3.66%	3.66%	2.99%
Target KEA UK IRL	3.36%	3.27%	3.18%	3.09%	2.99%	2.99%

Horizontal en-route flight efficiency KPI (Ireland)



Ireland 2019				Ireland 2020			
Date	KEA	KEP	KES	Date	KEA	KEP	KES
31/01/2019	1.24	2.46	2.36	31/01/2020	1.25	2.42	2.21
28/02/2019	1.23	2.43	2.34	29/02/2020	1.25	2.45	2.22
31/03/2019	1.23	2.46	2.37	31/03/2020	1.24	2.43	2.18
30/04/2019	1.21	2.44	2.35	30/04/2020	1.24	2.39	2.13
31/05/2019	1.21	2.41	2.32	31/05/2020	1.23	2.37	2.09
30/06/2019	1.21	2.38	2.28	30/06/2020	1.21	2.39	2.09
31/07/2019	1.21	2.38	2.28	31/07/2020	1.20	2.40	2.06
31/08/2019	1.21	2.40	2.27	31/08/2020	1.20	2.40	2.04
30/09/2019	1.22	2.39	2.26	30/09/2020	1.19	2.41	2.01
31/10/2019	1.22	2.39	2.24	31/10/2020	1.16	2.40	1.95
30/11/2019	1.22	2.40	2.23	30/11/2020	1.13	2.33	1.89
31/12/2019	1.23	2.41	2.22	31/12/2020	1.11	2.32	1.85

Horizontal en-route flight efficiency KPI (UK-Ireland FAB)



UK/Ireland FAB 2019				UK/Ireland FAB 2020			
Date	KEA	KEP	KES	Date	KEA	KEP	KES
31/01/2019	3.62	6.15	5.75	31/01/2020	3.67	6.16	5.73
28/02/2019	3.62	6.13	5.73	29/02/2020	3.69	6.17	5.73
31/03/2019	3.62	6.14	5.74	31/03/2020	3.66	6.16	5.71
30/04/2019	3.61	6.14	5.75	30/04/2020	3.64	6.13	5.67
31/05/2019	3.61	6.13	5.74	31/05/2020	3.60	6.11	5.64
30/06/2019	3.61	6.12	5.73	30/06/2020	3.55	6.10	5.61
31/07/2019	3.62	6.12	5.73	31/07/2020	3.48	6.11	5.59
31/08/2019	3.63	6.11	5.73	31/08/2020	3.43	6.13	5.59
30/09/2019	3.65	6.12	5.73	30/09/2020	3.34	6.12	5.57
31/10/2019	3.65	6.12	5.72	31/10/2020	3.23	6.10	5.51
30/11/2019	3.64	6.12	5.72	30/11/2020	3.13	6.07	5.46
31/12/2019	3.65	6.14	5.72	31/12/2020	2.99	6.02	5.39

Borealis Key Environment Indicators

Borealis Continuous Climb Operations (by State)

Continuous Climb Operations	Denmark	Estonia	Finland	Iceland	Ireland	Latvia	Norway	Sweden	United Kingdom
Average time in level flight to ToC (seconds)	18.04	12.6	17.36		14.84	15.81	9.86	14.24	30.19
% of Continuous Climb Operations to ToC	88.77%	90.43%	80.01%		85.91%	82.30%	93.57%	88.95%	70.44%
Total level time Continuous Climb Operations (Climbs*sec.)	1,097,667	110,182	582,052		726,116	257,989	1,385,679	977,903	12,690,985

Borealis Continuous Descent Operations (by State)

Continuous Descent Operations	Denmark	Estonia	Finland	Iceland	Ireland	Latvia	Norway	Sweden	United Kingdom
Fuel Average Time in level flight from ToD (Sec)	73.98	49.47	49.35		90.17	55.88	60.22	71.84	185.4
% Fuel Continuous Descent Operations from ToD	49.74%	60.90%	59.47%		46.23%	56.33%	69.45%	42.61%	26.27%
Total level time Continuous Descent Operations (Descents*sec.)	4,520,521	432,394	1,661,377		4,403,697	911,757	9,038,605	4,930,700	77,836,591

Borealis Arrival Sequencing and Metering Area (ASMA)

Arrival Sequencing and Metering Area (ASMA)	Denmark	Estonia	Finland	Iceland	Ireland	Latvia	Norway	Sweden	United Kingdom
	0.93	0.47	1.03		1.33	0.76	0.62	0.97	2.44

Borealis Horizontal en-route flight efficiency 2020

State	Flight Efficiency (%)	% Δ	Tot add. distance (km)	% Δ	Avg. add. km per flight	% Δ
Finland	99.08%	0.13%	223840	-60.33%	2.44	-5.65%
Sweden	98.96%	0.24%	1077285	-65.39%	3.65	-16.38%
Ireland	98.89%	0.11%	622400	-60.94%	3.81	-4.61%
Denmark	98.88%	0.05%	496331	-61.19%	2.22	-4.07%
Estonia	98.78%	0.22%	258852	-64.29%	2.93	-12.54%
Latvia	98.76%	0.11%	300330	-60.47%	2.55	-8.68%
Norway	98.45%	0.51%	1100643	-62.05%	4.34	-28.94%
UK (Continental)	96.69%	0.64%	9783107	-67.01%	9.88	-15.59%

Appendix 6 Updated Cost of Capital

IAA's En Route and Terminal Services Cost of Capital

Prepared for IAA

31 March 2021

FIRST ECONOMICS

www.first-economics.com

1. Introduction

This report contains First Economics' estimates of the costs of capital for IAA's en route and terminal services businesses. It is intended to inform calculations of the allowed returns that are to be factored into IAA's revised RP3 charges.

The paper is structured into seven main parts:

- section 2 outlines the methodology that we have used in our work;
- section 3 assesses the risk that IAA's equity carries and puts forward estimates of betas;
- section 4 gives a figure for gearing;
- section 5 provides a calculation of the cost of debt;
- section 6 contains estimates of the two generic parameters in the cost of equity calculation – the risk-free rate and the expected market return;
- section 7 considers tax; and
- section 8 brings all of the preceding inputs together into an overall estimate of the cost of capital.

2. Approach

The cost of capital that we consider in this paper is a forward-looking estimate of the returns that the en route and terminal services businesses need to provide in order to attract and retain investor capital. In line with the terms of reference that were given to us by IAA, and consistent with regulatory practice more generally, we have deliberately sought to estimate this cost of capital independently from IAA's current ownership arrangements so that the return on offer through charge controls is capable of supporting any reasonable and efficient investor set.

The cost of capital is a weighted average of two components: the cost of debt (K_d); and the cost of equity (K_e), where the weightings (gearing or g) reflect the relative importance of each type of financing in a firm's capital structure.

$$WACC = g \,.\, K_d + (1 - g) \,.\, K_e$$

The cost of debt is directly measurable and in the analysis that follows we reference IAA's intended RP3 borrowing arrangements to calculate the value of K_d. The cost of equity, by contrast, cannot be directly observed and we have instead modelled the returns that we would expect a shareholder to demand in exchange for holding shares in a stand-alone en route and terminal services business. The tool that we have used in our analysis is the CAPM, which relates the cost of equity to the risk-free rate (R_f), the expected return on the market portfolio (R_m), and a business-specific measure of investors' exposure to systematic risk (beta or β_e):

$$K_e = R_f + \beta_e . (R_m - R_f)$$

The two equations together show that our costs of capital calculations are based on estimates of five parameters: g, K_d, R_f, R_m and beta. In putting specific figures against each of these inputs we have sought to draw as far as possible on primary market data. We have also taken account of recent regulatory precedent, giving particular attention to the views that Irish regulators and UK regulators have expressed in recent decisions. Inevitably, in many areas we have had ultimately to exercise a degree of judgment in order to be able to select precise numbers from the evidence we have collected, but we have tried in the analysis that follows to give a clear explanation for these judgments and to make our thinking as transparent as possible in order to assist the parties to forthcoming consultations.

3. Riskiness and Beta

We start deliberately with a section on risk profiles and betas on the basis that the analysis that follows describes the key features of the businesses whose costs of capital we are trying to estimate.

3.1 Preliminaries

Methodology

A firm's equity beta is a measure of the riskiness of a firm – or more specifically, a measure of the systematic risk that a firm presents – relative to the market portfolio. Firms that exhibit a beta of more than 1 can be considered more risky than the average stock market investment and need to pay their investors a higher-than-average return; firms with a beta of less than 1 are less risky and warrant lower returns; and firms with a beta of exactly 1 are seen by investors as being of equal risk to the market portfolio and are expected to generate a return in line with R_m.

Empirical estimates of beta are usually obtained by measuring the covariance between movements in a company's share price and movements in the value of the stock market as a whole. However, in this report we are interested in obtaining beta estimates for two unlisted businesses and cannot use market data directly. The next best alternative that we have is to collect beta estimates for companies that look to be in some sense similar and to make a judgment about the value of the en route and terminal services beta on the basis of this comparator evidence. This is an approach that has been deployed in an increasing number of periodic reviews during recent years as the number of regulated companies with a stock market listing has become very limited, and is regarded as a robust and reliable way of assessing beta in the absence of direct stock market data.

Asset beta

When comparing the betas of different firms, one has to be careful to take account of the different gearing levels that firms choose since, all other things being equal, a firm with higher gearing will present higher risk to shareholders and exhibit a higher equity beta. Unless one controls for this effect, there is a danger of confusing the risk that comes from high leverage with the underlying business risk that a firm faces by virtue of the nature of the activities it is carrying out.

This is where the concept of an asset beta proves useful. An asset beta is a hypothetical measure of the beta that a firm would have if it had no debt and were financed entirely by equity. By comparing different firms' asset betas it becomes possible to isolate the underlying systematic risk that a company has and carry out an assessment of the relative riskiness of different businesses.

The asset beta is calculated using the following formula:

$$\beta_a = (1 - g) \cdot \beta_e + g \cdot \beta_d$$

where β_a is a firm's asset beta, g is gearing and β_d is the firm's debt beta.[32]

A firm's actual gearing is something that is easily calculated using reported debt figures and market capitalisation, but a firm's debt beta is not something that is directly observable. We have assumed in our work that β_d is a constant of 0.1.

3.2 Comparator analysis

Our comparator set comprises the most recent decisions about betas made by the Commission for Aviation Regulation, the Commission for Communications Regulation, the Commission for Regulation of Utilities, the SEM Committee, the UK's Civil Aviation Authority, the UK's Competition & Markets Authority, Ofgem and Ofwat. We also consider beta estimates produced in pricing decisions for three other air navigation service providers.

The comparator data is set out below.

Table 1: Beta estimates used in recent periodic reviews of regulated firms

	Regulators' estimates of asset beta
Electricity, gas and water network utilities	0.30 to 0.42
New entrant generation plant	0.69
Fixed line telecommunications company	0.43
Mobile telecommunications company	0.48
Dublin airport (NB: pre-COVID)	0.50
Gatwick airport (NB: pre-COVID)	0.56
Heathrow airport (NB: pre-COVID)	0.50

References: CAA (2014), Estimating the cost of capital – technical appendix for the economic regulation of Heathrow and Gatwick from April 2014; Commission for Energy Regulation (2017), Decision on October 2017 to September 2022 distribution revenue for Gas Networks Ireland; SEM

[32] For those that have not come across this concept before, a debt beta is similar to the equity beta, but rather than measuring the systematic risk taken by the company's shareholders, it represents such risk presented to the company's lenders.

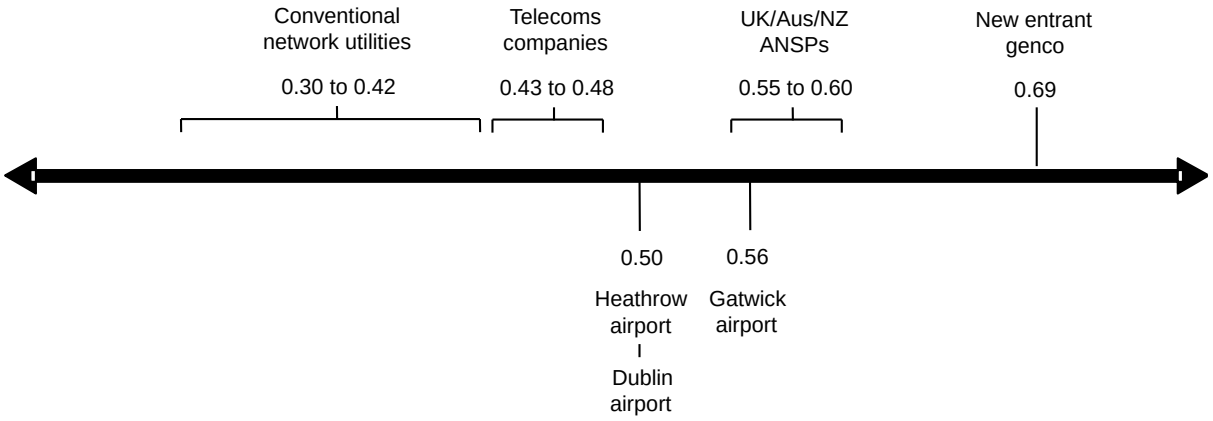
Committee (2018), Best new entrant decision paper; Commission for Aviation Regulation (2019), Determination on the maximum level of airport charges at Dublin Airport 2020-24; Commission for Regulation of Utilities (2020), Irish Water revenue control 3 (2020-24); Commission for Communications Regulation (2020), Review of weighted average cost of capital (WACC) – response to consultation and final decision; Commission for Regulation of Utilities (2020), Price review five (PR5) TSO and TAO transmission revenue for 2021-2025; CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: final report.

Table 2: ANSP beta estimates

	Estimate of asset beta
NERL, UK RP3 (NB: pre-COVID)	0.57
Airservices, Australia (NB: pre-COVID)	0.55
Airways New Zealand (NB: pre-COVID)	0.60

References: Competition & Markets Authority (2020), NATS (En Route) plc / CAA regulatory appeal; Airservices (2016), Pricing proposal 2016-21; Airways New Zealand (2016), Airways' proposed pricing for the 2019-22 period.

Figure 3: Summary of comparator analysis in tables 1 and 2



The evidence shows that conventional utility network companies have the lowest asset betas and that other regulated companies have been ascribed betas which sit at a premium to this base. This is a picture that can be found in many similar reports and should not be regarded as controversial in itself. The difficult decision that we face is not to identify the betas of comparator companies but to position IAA's en route and terminal services businesses at an appropriate point in the spectrum.

3.3 First Economics' pre-COVID 2019 analysis

In a 2019 report that we prepared before the emergence of the COVID-19 pandemic, we suggested that IAA's en route and terminal services asset beta would fall in the range 0.65 to 0.70. Our analysis, which we have reproduced as annex B to this report, was that IAA has a greater exposure to systematic volume risk than any of the above-mentioned comparator companies, principally on account of its very small investor capital base relative to the amount of cost and revenue that it manages. It therefore seemed logical to position IAA's beta a small distance above the ANSP betas in table 2 / figure 3.

3.4 Updated Assessment

Since completing our work, IAA has had to deal with the consequences of an unprecedented reduction in traffic levels. Among other things, this has meant:

- a sizeable loss of revenue, resulting in a sizeable shortfall in funding for IAA's ongoing expenditures and a sizeable call on IAA's cash reserves; and
- a reopening of the RP3 Performance Plan in line with EC Regulation 2020/1627 encompassing, among other things –
  - a switch to a new arrangement for the recovery of 2020 and 2021 costs in which payment by airlines of a proportion of revenues owed to IAA for the first two years of RP3 is to be spread over a period of five to seven years;
  - an upcoming rebaselining of charges for the three-year period 2022 to 2024.

The levels of financial risk in IAA's operating environment have therefore very clearly grown over the last year as a result of the pandemic's impact on the wider industry. Looking forward, there remains, at the time of writing, considerable uncertainty around the timetable for reopening international borders and, consequently, the likely trajectory of recovery. All other things being equal, this makes the provision of air navigation services a riskier activity than we envisaged two years.

Set against this, the regulatory framework has helped to contain the impacts of traffic reductions on shareholder returns. Our understanding is that the reopening of the RP3 Performance Plan is intended to support the recovery of en route and terminal services costs, and that IAA is unlikely to suffer any unforeseen losses as a result of the resetting and reprofiling of 2020 and 2021 revenue entitlement out to beyond 2022. IAA has also told us to assume that the 'normal' allocation of volume risk will resume from 2022 onwards, albeit in a world in which setting base case traffic forecasts will be extremely challenging.

Putting these two things together, it is not clear to us that we have sufficient evidence at this time to alter our previous estimate of beta.

While there is evidence that aviation industry betas have increased over the last year while the aviation sector has been buffeted by COVID-19,[33] most of the empirical data comes from airlines and airports which are unregulated or which operate under different regulatory rules. We also note that backward-looking estimates of beta are likely to be picking up shareholder reaction to announcements about social distancing and border closures, whereas a forward-looking estimate of beta needs to reflect the covariance that there will be with market returns during a period of recovery with quite different associated risk factors.

Provided that the allocation of risk comes out in line with EC Regulation 2020/1627, we would find it hard to state with any certainty that IAA's exposure to systematic volume risks has been redefined in a material way through the events of the last year or that there is likely to have been a meaningful shift up or down in IAA's beta. In terms of fundamentals, ANSPs still look riskier than other regulated businesses on account of their exposure to demand risk and relatively small investor capital bases and IAA still looks riskier than other ANSPs on account of its capital to revenue/cost ratio. We therefore propose to stick with our positioning of IAA at the right-hand side of figure 3 – i.e. a range for beta of

[33] See, for example, Heathrow Airport (2020), H7 revised business plan, p.394.

0.65 to 0.70. However, this assessment will need to be kept under review during the implementation of the revised Performance Plan.

4. Gearing

The estimate that we make of gearing affects the weightings of the cost of debt and cost of equity components of the weighted average cost of capital calculation. They are also important inputs to the calculation of the cost of debt and cost of equity themselves as, all other things being equal, a higher level of gearing will increase the risk to both debt and equity holders, causing them to demand a higher return in exchange for making capital available.

The Charging Regulation specifies that the weights given to debt and equity in the cost of capital calculation "shall be based on the proportion of financing through debt or equity". At the time of writing IAA has zero borrowing, however IAA has told us that it expects this position to change during the remainder of RP3.

The amount of any future borrowing is currently uncertain and will depend in part on the pressures that the COVID pandemic continues to place on IAA's finances and in part on the way in which IAA's assets are split at the end of the ongoing restructuring of IAA's functions. IAA has suggested that we should proceed on the assumption that there could be a 50:50 split of debt and equity financing. We therefore use a 50% gearing assumption in the calculations that follow.

5. Cost of Debt

The Charging Regulation specifies that the allowed cost of debt should be "equal to the average interest rates on debts of the air navigation services provider". ✂.

Our 50% gearing assumption translates into borrowing of approximately €50m. ✂.

In order to estimate the cost to IAA, we need to make a forecast of EURIBOR. The spot rate at the time of writing is around -0.5%. Figure 4 shows that this figure is not dissimilar to the rates that we have seen in the last five years.

Figure 4: Historical values of 12-month EURIBOR

Source: www.euribor-rates.eu.

In section 6, we explain that the economic outlook for the next 3-4 years has interest rates moving up only very slightly from current levels. For the purposes of our analysis, we therefore provide for a 0% EURIBOR through to the end of RP3.

Our resulting calculation of the cost to IAA of borrowing €50m is set out in table 5.

Table 5: Cost of debt calculation

✂

The cost of debt that goes into our cost of capital calculation is a real, inflation-stripped cost of debt. Our forecast of CPI inflation comes from the International Monetary Fund's October 2020 World Economic Outlook.

Table 6: IMF CPI annual inflation forecasts (%)

	2020	2021	2022	2023	2014
CPI inflation	-0.2	0.6	1.9	2.0	2.0

Source: IMF World Economic Outlook.

We take the average five-year annual inflation rate of 1.26% as our forecast of the average annual inflation rate for the whole of RP3.

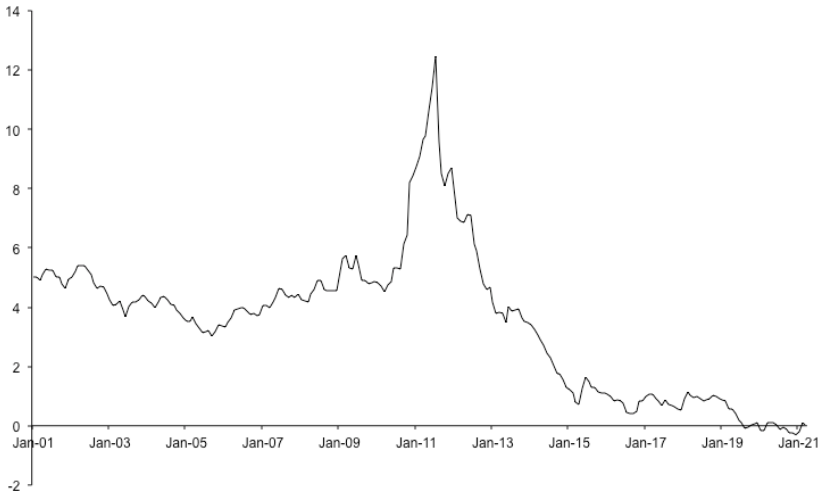
This means that our 1.52% nominal cost of debt translates into a real cost of debt of 0.3%.[34]

6. Generic Cost of Equity Parameters

6.1 Risk-free rate

The approach used by regulators to assess the risk-free rate has in the past been to analyse yields on government-issued gilts. Figure 7 below plots the yield on a 10-year Irish government bond since 2001.

Figure 7: Ireland ten-year government bond yields (nominal, %)



Source: ECB.

[34] The formula is: (1 + nominal cost of debt) = (1 + real cost of debt) x (1 + inflation).

The chart shows a pattern of falling yields over a period of more than a decade. Prior to 2008, when investors suddenly took fright at the integrity of the financial system during the global financial crisis, yields were fairly stable at between 3.5% and 5.0%. Thereafter yields rose as confidence in Irish government's ability to pays it debts drained away. That confidence appears then to have returned gradually between 2011 and 2015, after which yields settled at around 1%, broadly in line with the average risk-free rate in other eurozone economies. However, since mid-2019, yields have moved lower, oscillating around a return of 0%.

Against this backdrop, Ireland's economic regulators have in recent years taken one of two quite contrasting approaches when choosing a value for the CAPM risk-free rate. In a majority of recent decisions, regulators have determined that current yields likely sit below the long-term 'equilibrium' risk-free rate. This has led them to select a figure for the risk-free rate that sits above current market rates and close to the values seen prior to 2008. By contrast, on other occasions regulators have decided that current yields, adjusted for market expectations of short- to medium-term changes in interest rates, are the best indicator of the return that investors will be able obtain by investing in a riskless asset in the next regulatory period. This has led to the selection of negative real risk-free rate estimates.

Table 8 catalogues recent thinking on this matter. (NB: the figures in the table are for the real risk-free rate – i.e. the nominal risk-free stripped of inflation.)

Table 8: Real risk-free rate assumptions in relevant regulatory reviews

Decision	Risk-free rate assumption	Year
CER – Gas Networks Ireland	1.9%	2017
SEM Committee – new entrant genco	1.75%	2018
CAR – Dublin Airport	-0.6%	2019
CRU – Irish Water	1.75%	2019
Comreg – telecoms companies	1.75%	2020
CRU – ESB and Eirgrid	-0.9%	2020

We have a preference for the approach used by the Commission for Aviation Regulation in its 2019 airport decision and by the Commission for Utilities Regulation in its 2020 electricity price control decision. At a point in time when the ECB's latest forecasts[35] show only a small increase in interest rates coming through in the next 12-24 months from the low base shown in figure 7, it is hard to justify calibrating IAA's cost of equity against an assumption that investors can obtain a 1.75% real return (equivalent to a >3% nominal return) when investing in a riskless asset. Instead, we think it is necessary to give weight to the evidence that shows that investors are at present, and for the foreseeable future, willing to accept negative real returns on very low-risk investments.

Our preferred real risk-free rate estimate is -1%. This is a small way above the observed real, inflation-stripped yield on 10-year Irish government bonds over the last 6-12 months to recognise (a) the prospect

[35] ECB (2021), April 2021 ECB staff macroeconomic projections for the euro area.

of a modest increase in interest rates during the remainder of RP3 and (b) the slightly higher yields at present on other proxies for the riskless asset (e.g. AAA-rated non-government bonds).

5.2 Expected market return

The final input into CAPM is the expected market return (R_m). Some cost of capital studies arrive at a value for R_m directly Others come at R_m indirectly by estimating the equity risk premium (ERP) – i.e. the additional return that shareholders can earn over the risk-free rate – and adding the ERP to the forecast risk-free rate. We prefer the former approach.

The R_m figures used in recent regulatory decisions are summarised in the table below. This body of precedent contains a fairly narrow range for the expected market return from 6.4% to 6.75%.

Table 9: R_m assumptions in recent regulatory reviews

Decision	Equity-risk premium assumption	Year
CER – Gas Networks Ireland	6.65%	2017
SEM Committee – new entrant genco	6.54%	2018
CAR – Dublin Airport	6.4%	2019
CRU – Irish Water	6.75%	2019
Comreg – telecoms companies	6.65%	2020
CRU – ESB and Eirgrid	6.4%	2020

We note that this range is consistent with the R_m values that UK regulators have been using in recent reviews. The most recent decision in this area was issued by the Competition & Markets Authority (CMA) in March 2020 and cited a point estimate of 6.81%.

We use a range for R_m of 6.4% to 6.8% in our calculations to be consistent with this body of recent regulatory precedent.

7. Tax

The prevailing corporation tax rate in Ireland is 12.5%. Because our costs of capital are pre-tax costs of capital, we need to uplift our CAPM cost of equity calculations by this amount if we are to ensure that charge controls cover return shareholders their full cost of equity after the payment of tax on profits.

8. Overall Cost of Capital Calculation and Conclusions

Table 10 combines our individual component estimates into a range for the overall pre-tax cost of capital.

Table 10: Proposed range for the IAA cost of capital

	Low	High
Gearing, g	0.5	0.5
Cost of debt, K_d (%)	0.3%	0.3%
Risk-free rate, R_f (%) Expected market return, R_m (%)	-1.0% 6.4% 0.65	-1.0% 6.8% 0.70

Asset beta, β_a	1.20	1.30
Equity beta, β_e	7.88%	9.14%
Post-tax cost of equity (%)	12.5%	12.5%
Tax (%)	9.01%	10.45%
Pre-tax cost of equity, K_e (%)		
Pre-tax WACC (%)	4.7%	5.4%

Our estimated range for the real, pre-tax cost of capital is 4.7% to 5.4%.

This range is broadly in line with the 5% cost of capital that was factored into the RP3 Performance Plan, reflecting our assessment that there is not sufficient at this time to alter our previous estimate of IAA's beta.

It is slightly above the Commission for Aviation Regulation's pre-COVID calculation of Dublin Airport's cost of capital of 4.22%, reflecting IAA's small investor capital base and consequent higher riskiness.

We are happy that the evidence outlined in the paper supports the figures that we are proposing. We therefore commend them to IAA.

Annex A: Conversion of Real WACC to Nominal WACC

The costs of capital in the main body of the paper are presented in real, CPI-stripped terms.

The International Monetary Fund's October 2020 forecasts for CPI inflation during RP3 is given in table A1 below.

Table A1: IMF forecast of Irish CPI inflation

	2020	2021	2022	2023	2024
CPI inflation	-0.2%	0.6%	1.9%	2.0%	2.0%

Source: IMF (2019), World economic outlook, October 2020.

The conversion from our real 4.7% to 5.4% real range to a nominal cost of capital range is given in the table below.[36]

Table A2: First Economics' nominal cost of capital range

Year	Low	High
2020	4.44%	5.16%
2021	5.29%	6.01%
2022	6.68%	7.40%
2023	6.79%	7.51%
2024	6.79%	7.51%

[36] We convert the real risk-free rate and the real cost of debt into nominal values using the Fisher equation, and then proceed to calculate the cost of capital in accordance with the formulae in sections 2 and 3 in the main body of the paper.

Annex B: Excerpt from First Economics' 2019 Report for IAA – Beta

[The text below is our 2019 analysis of IAA's beta.]

En route and terminal services betas

Approach to comparisons of riskiness

[In order to position IAA's en route and terminal services beta], it is useful to highlight four main determinants of the (systematic) risk that the equity in IAA bears.

- Demand variability – IAA operates in markets where demand for its services is very closely correlated to the overall volumes in the aviation sector. These volumes will in turn be sensitive to macroeconomic conditions, insofar as a downturn in the local or global economy will cause people to travel less and cause airlines to fly fewer planes, and vice versa for any upturn. The aviation sector has also shown itself to be very sensitive to other shocks, including terrorist incidents and even volcanic eruptions.
- Cost variability – IAA relies heavily on direct and indirect staff to carry out its functions. As labour becomes more expensive, whether through wages, social security costs or pension costs, IAA's costs will go up, and as labour becomes less expensive costs will go down. Similarly, on the capex side of costs, IAA is exposed to changes in the costs of IT products.
- Regulation – the two previous risk factors cannot be looked at in isolation from the important role that regulation plays in determining the way in which changes in volumes or costs translate into changes in profit. Through the design of charge control arrangements and associated incentive mechanisms the European Commission exerts a significant degree of control over the degree to which shareholders are exposed to risk – a situation that distinguishes regulated companies from unregulated companies. In particular, risk-sharing arrangements around volumes, where available, can offer shareholders protection against changes in demand, while the feed through between IAA's actual costs and prices will determine how far shareholders are exposed to cost shocks.
- Cost/revenue structure – a final consideration is the sensitivity of profit to out-/under-performance against the networks' price control assumptions. In particular, it is now widely acknowledged in regulation that companies which have small asset bases in comparison to ongoing revenues present shareholders with much greater risk than companies which have large asset bases in comparison to ongoing revenues.

The first three items on this list are fairly straightforward to understand, but the fourth merits a slightly more detailed explanation. In the worked example below, we depict two companies with identical ongoing expenditures. They differ only insofar as company A has a small regulatory asset base and company B has a large regulatory asset base. Both companies set charges so as to be able to cover their expenditure plus a return on the regulatory asset base (RAB). For the purposes of this illustration, let us assume initially that both companies seek a return of 10% per annum.

Table B1: Illustrative worked example

	Company A	Company B
RAB	€100m	€1,000m
Expenditure	€200m	€200m
Return on RAB @ 10%	€10m	€100m
Revenues	€210m	€300m

Now consider what happens to these companies when they experience the same percentage cost overrun or the same percentage revenue loss. Although the absolute €m loss of profit is similar in both companies, the percentage loss is far greater for company A with the small RAB than it is for the company B with the larger RAB.

Table B2: Revenues, costs and profits after a 2% cost shock

	Company A	Company B
RAB	€100m	€1,000m
Revenue	€210m	€300m
Expenditure	€204m	€204m
Profit	€6m	€96m
Profit as % of RAB	6%	9.6%

Table B3: Revenues, costs and profits after a 2% revenue shock

	Company A	Company B
RAB	€100m	€1,000m
Revenue	€205.8m	€294m
Expenditure	€200m	€200m
Profit	€5.8m	€90m
Profit as % of RAB	5.8%	9.4%

An exactly analogous story can be told of the effects of unexpected cost reductions and about revenue gains, insofar as a given cost or revenue shock causes a greater percentage change in profits for companies with small asset bases.

This provides important insights into the riskiness of different firms because it shows that the variability in out-turn profits is not just a function of the likelihood and scale of cost and demand shocks, but also the upfront margin that is factored into allowed revenues. Holding all other things equal, shareholders in a regulated company with a small RAB/profit relative to ongoing costs are likely to suffer proportionately more when downside shocks occur (and gain more following upside events) in comparison to shareholders in firms whose RABs/profits are large relative to ongoing costs.

This higher potential volatility in profits makes companies with high ‘operational gearing’ more risky in the eyes of shareholders. Consequently, a firm with a small RAB would not have the same cost of

capital and would not seek the same return as a company with a large RAB. It would instead need to factor a higher cost of capital upfront into its charges.

Comparison of risk profiles

It follows that in order to understand how much risk the different shareholders in our sample of comparator firms are exposed to one has to look holistically at the potential volatility in demand and costs, take the range of outcomes that one can envisage through the sector's regulatory rules and then examine the impact on each comparator's profits. It is not possible to evaluate riskiness without taking the full chain of events into account – in particular, we would caution anyone from making judgments about a business's risk profile on the basis of perceptions of industry demand and industry cost variability alone.

Despite their similarities, the regulated companies in table 1/table 2/figure 3 are not identical in any of the above respects, as table B4 demonstrates.

Table B4: Characteristics of regulated companies

	Exposure to demand risk	**Exposure to cost risk**	**Operational gearing**
Conventional utility utilities	Low – companies typically have revenue caps, giving a fixed entitlement to collect revenues irrespective of demand	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design exposes companies to a fixed proportion of variations in most of these costs.	Low to moderate – typical RAB-to-revenue ratios for network utilities are 4 to 6 times
Dublin airport	High – passenger volumes are highly sensitive to GDP growth and industry shocks. Dublin airport is regulated via a price cap, in which a change in volume feeds through 1-for-1 to a change in revenues.	Low to moderate – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle and a more noticeable exposure to swings in utility and security costs. The Commission's price control design exposes the airport to variations in these costs until a price control reset after five years.	Low to moderate – RAB-to-revenue ratio of 4 times
Heathrow airport	High – passenger volumes are highly sensitive to GDP growth and industry shocks. Heathrow is regulated via a price cap, in which a change in passenger numbers feeds through 1-	Low to moderate – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle and a more noticeable exposure to	Low – RAB-to-revenue ratio of 6 times

	for-1 to a change in revenues.	swings in utility and security costs. The CAA price control design exposes the airport to variations in these costs until a price control reset after five years.	

Gatwick airport	High – passenger volumes are highly sensitive to GDP growth and industry shocks. Gatwick is regulated via a price cap, in which a change in passenger numbers feeds through 1-for-1 to a change in revenues.	Low to moderate – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle and a more noticeable exposure to swings in utility and security costs. The CAA price control design exposes the airport to variations in these costs until a price control reset after five years.	Low to moderate – RAB-to-revenue ratio of 4.5 times
New entrant genco	Moderate – volumes/sales are sensitive to GDP growth, although a capacity payment mechanism provides some guaranteed income	Moderate – costs comprise mainly fuel purchase costs and some labour costs, giving exposure to commodity prices. Cost recovery is via the competitive market	n/a
Telecoms companies	Moderate to high – volumes/sales are sensitive to GDP growth	Moderate – costs comprise labour, equipment, IT and spectrum costs. Cost recovery is via the competitive market.	n/a

Source: First Economics' analysis.
Note: the RAB-to-revenue metric is intended to capture the observations we made earlier about the higher riskiness of firms with small RABs/profits. A high RAB-to-revenue ratio implies that profits are fairly resilient in the face of shocks and a small RAB-to-revenue ratio implies that returns can be affected quite significantly by even small variations in costs and revenues. Our calculations of revenues include both the aeronautical revenue and non-aeronautical revenue that is included in the regulators' price control calculations.

We make the following observations about the entries in this table:

- the conventional network businesses all exhibit negligible revenue risk, relatively low cost risk, and have sizeable RABs. This largely explains why they sit at the left-hand side of the spectrum that we drew in figure 3; and
- all of the companies that sit to the right of the energy and water networks have fairly obvious characteristics that make them riskier in the eyes of investors. Exposure to volume/revenue risk, in particular, cause each of a new entrant genco, telecoms companies and airports to have a higher equity beta than the conventional network utilities.

Assessment

The position of IAA's en route and terminal services businesses depends crucially on the regulatory framework that they operate under in future.

The Charging Regulation requires that en route and terminal services charges are to be fixed in advance for each new Reference Period, and adjusted thereafter only in accordance with a set of common principles. These include the following allocations of volume and cost risk:

- volume risk is to be allocated in such a way that –
  - the ANSP takes any gain or loss of revenue if service units are within ±2% of forecast;
  - gains and losses in revenue are to be split 30% to the ANSP and 70% to the airlines after actual service units move more than 2% but less than 10% outside of forecast;
  - airlines take all of the gain or loss of revenue once service units are more than ±10% outside of forecast;
- differences between actual and forecasts costs are to be borne by the ANSP except where it has been deemed in advance that items of cost are outside of the ANSP's control

We can add two further entries to the list in table B4 as follows.

Table B5: Characteristics of regulated companies

	Exposure to demand risk	**Exposure to cost risk**	**Operational gearing**
IAA – en route	Moderate to high – service unit volumes are sensitive to GDP growth and industry shocks. The current Charging Regulation requires: - IAA to bear volume risk if service unit volumes are within ±2% of forecast - revenues gains and revenues losses to be split 30% to IAA and 70% to airlines when service unit volumes move beyond 2% but below 10% of forecast - airlines to bear volume risk beyond ±10% of forecast	Low to moderate – costs are a mixture of labour opex plus IT investments. IAA is exposed to variations in these costs until the price control reset at the end of the five-year period.	Very high – RAB-to-revenue ratio of 0.7 times at the end of RP2 reducing to 0.5 times in RP3
IAA – terminal services	Moderate to high – service unit volumes are sensitive to GDP growth and industry shocks. There is also a	Moderate – costs are a mixture of labour opex plus IT investments. In RP3, IAA will be taking on a major capex project that will almost treble its	High – RAB-to-revenue ratio of 1.3 times at the end of RP2 rising to 2 times in RP3

	dependence on two main airline customers. The current Charging Regulation requires: - IAA to bear volume risk if service unit volumes are within ±2% of forecast - volume risk to be split 30% to IAA and 70% to airlines if service unit volumes are beyond 2% but below 10% of forecast - airlines to bear volume risk beyond ±10% of forecast	RAB. IAA is exposed to variations in costs until the price control reset at the end of the five-year period.	

When we compare the entries in table 8 to the comparator set in table 7 we can observe that:

- exposure to volume risk and small RABs / high operational gearing mean that it is very clear that both the en route and terminal services businesses are more risky than conventional network utilities;
- there are offsetting factors to consider when comparing to Dublin, Heathrow, Gatwick airports. The airports are exposed to more volume risk, both by virtue of having price caps defined with reference to passenger numbers rather than service units and by taking volume risk in full without recourse to sharing arrangements. But the airports also have significantly lower operational gearing, meaning that revenue shocks, when they occur, have less of an impact on returns as a % of the RAB;
- the terminal services business's RP3 capex plan is also a material source of risk; and
- comparisons to companies operating in competitive markets are less straight-forward, but the en route and terminal services businesses very small starting asset bases mark them out as highly unusual businesses.

These observations help us to position the IAA betas.

Looking first of all at the comparison to conventional network utilities, we can say that the IAA betas should be placed at a clear distance above conventional utility betas.

Turning next to the airport betas, we have to consider how higher operational gearing, lower volume risk and the terminal services business's capex risk interact. Our analysis is that the first of these things outweighs the second, meaning that IAA has much less certainty around profit in comparison to the airport companies.

In the case of the en route business:

- even if IAA's service unit volumes stay within the first ±2% band in the RP3 volume risk-sharing scheme, IAA stands to lose or make money equivalent to 60% of the real return on capital that IAA has indicated to us is likely to be factored into its RP3 en route charge control calculations;[37]
- by comparison, Dublin Airport would need a misforecast of passenger volumes of around 25% in order to suffer the same sort of loss or gain in profit;[38] and
- for Gatwick and Heathrow, the figures are around 25% and 30% respectively.[39]

In the case of the terminal services business:

- even if IAA's service unit volumes stay within the first ±2% band in the RP3 volume risk-sharing scheme, IAA stands to lose or make money equivalent to almost 20% of the real return that IAA has indicated to us is likely to be factored into its RP3 terminal services control calculations;[40]
- Dublin, Gatwick and Heathrow airports would have to misforecast passenger volumes by about 10% in order to suffer the same loss or gain in profit; and
- the near trebling of IAA's terminal services RAB is without parallel in the airport businesses.

IAA's small asset base and consequent thin margins mean that the en route and terminal services betas should naturally sit at the right-hand end of the spectrum that we drew in figure 3. Making point estimates is by no means straight-forward. The Commission for Aviation Regulation previously estimated the terminal services asset beta to be 0.65 and we have no reason to depart from this figure. The en route business's smaller RAB / higher operational gearing potentially means that it should have a higher beta. We therefore propose an overall asset beta range for IAA of 0.65 to 0.70.

Comparison to other ANSP beta estimates

The betas estimated by other ANSPs offers another form of cross-check on the above calculations. As table B6 shows, our estimates position IAA's betas above the betas of other ANSPs. But this is a logical picture to present given IAA's relatively small asset base as an ANSP and the consequent heightened sensitivity of profit to variations in costs and volumes.

Table B6: ANSP betas and riskiness

Company	Beta	Loss of profit caused by -2% loss of traffic
NERL, RP2	0.57	-20%
Airservices Australia	0.55	-20%
Airways New Zealand	0.60	-20%
IAA	0.65 to 0.70	-20% to -65%

[37] A 2% loss/gain of revenue for the en route business will be worth around €2.5m; this compares to a return on the RAB of around €4m.
[38] A 25% loss of airport charges revenue is worth around €50m. This compares to a return on the RAB of around €85m.
[39] At Gatwick, a 25% loss of airport charges revenue is worth around £90m. This compares to a return on the RAB of around £150m. At Heathrow, a 30% loss loss of airport charges revenue is worth around £450m. This compares to a return on the RAB of around £770m.
[40] A 2% loss/gain of revenue for the terminal services will be worth around €0.7-0.8m; this compares to a return on the RAB of €3-5m.

Finally, we note that a range of 0.65 to 0.70 would not be out of the realm of regulatory precedent, as shown by comparisons to Comreg's estimates of telecoms company betas.

We are therefore content to commend a range of 0.65 to 0.70 to IAA as a fair indicator of the riskiness of the en route and terminal services businesses, respectively.