Agenda Item: B.5.9*/C.6.1* WORKING PAPER WP No: 101
IFATCA'25

Policy Review of ATS 3.20 Environmental Issues in ATM

Presented by TOC/PLC

SUMMARY

The publication of several documents issued by international and national organisations, regarding future targets in terms of CO_2 and non-CO_2 emissions, is changing the aviation sector both at industrial and Air Traffic Management (ATM) levels. These defined emission goals over the coming decades have prompted a revision of the IFATCA Environmental Policy.

1. INTRODUCTION

1.1. The purpose of this document is to identify the necessary revision of the current IFATCA policy as published in the Technical and Professional Manual (TPM) ATS 3.20 ENVIRONMENTAL ISSUES IN ATM, which was last updated in 2011.

1.2. The problems at a global level regarding climate change, ambient noise levels, local air quality and water quality are evident in an industrialised and continuously growing population. This requires immediate corrective actions to reduce detrimental environmental impacts in all sectors, aviation included.

1.3. It is in this direction that many efforts have been put in place to produce new regulations and recommendations at an international level, in order to create new conditions to allow the necessary changes and achieve a consistent reduction of impacts, including greenhouse gas emissions over the next decades.

1.4. In 2023, ICAO adopted a long-term aspirational goal (LTAG) of net-zero emissions from international aviation by 2050. The ICAO LTAG is in line with the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement (COP21), which will see that CO_2 emissions are reduced sufficiently to limit warming to 1.5°C relative to the pre-industrial age and keep global warming well-below 2.0 °C (ICAO, 2022).

1.5. The requested actions for the reduction of CO_2 emissions rely on the collaboration of all stakeholders, each one responsible for the implementation of the necessary actions to make the aviation sector more efficient and less polluting.

1.6. From the aviation sector point of view, the efforts must be focused on the realisation of new technical and product solutions that can lead to fuel saving and zero emissions: new aircraft and components that reduce the weight and allow airlines to make flights more efficient and sustainable. In particular new engines, use of sustainable aviation fuels (SAF), new avionics with increased flight performances etc.

1.7. For air carriers, the focus should be more on optimised operations, both on the ground and in the air. Special attention to maintenance, use of new technologies and the modernisation of the fleet will be critical for airlines to meet their environmental targets.

1.8. ANSPs optimised use of the airspace and airports, coupled with constant research into enhanced infrastructures and operations that are aligned with environmental needs will be needed to meet environmental targets.

1.9. For airport operators, the challenge will focus mainly on the organisation of ground services and the realisation of green power and operating systems, which include the use of electric vehicles, alternative and renewable energy sources, optimised and efficient handling activities, etc.

1.10. In the field of air traffic management (ATM), a lot of attention must be given to all flight operations from the moment they leave the airport stand until their arrival at their destination.

1.11. In addition to all the above, the existence of a harmonised and fully coordinated network that involves all stakeholders with a special participation of regulators and policymakers is also important.

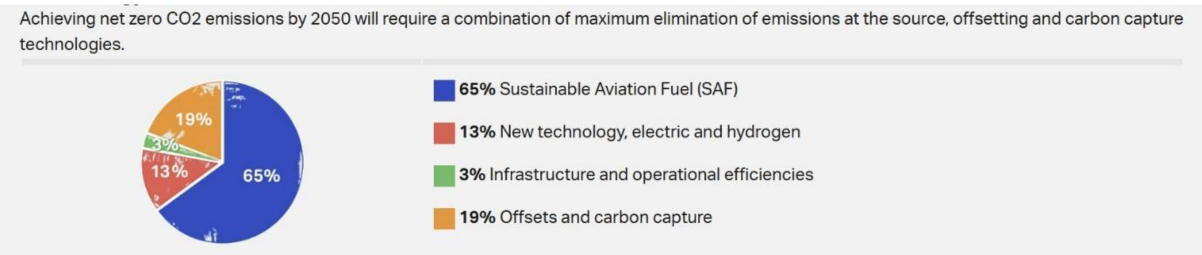
1.12. Another critical aspect of achieving the established goals is the employment of an appropriately skilled workforce to manage, use and support the new system. To successfully achieve this task, training activities will be the first fundamental activity to be developed and implemented, with special attention to human factors and legal aspects related to the future working environment.

1.13. The contribution of ATM to achieving future environmental targets is considered a determining factor.

1.14. According to the International Air Transport Association (IATA) the target for CO_2 emissions reduction can be achieved by using Sustainable Aviation Fuel (SAF), which is a biofuel produced from natural sources (usually waste and recycled materials), or through a synthetic process. According to IATA the use of SAF will result in the largest reduction of fossil fuel-related CO_2 emissions.

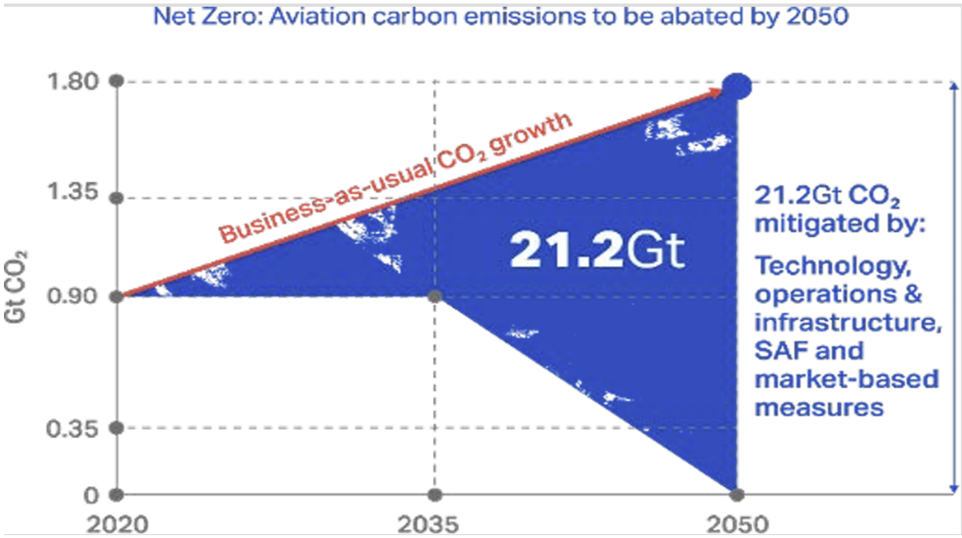
1.15. IATA estimates that SAF can contribute to 65% of the reduction in aviation emissions needed to achieve the net zero CO_2 emission target by 2050 (IATA, Net Zero Roadmap, 2023).

1.16. The ATM contribution, on the contrary, can be included in the three other items: new technology, electric and hydrogen, infrastructure and operational efficiencies.



Source: IATA, Fly Net Zero Program

Source: IATA, Operations Net Zero Roadmap,2023



IATA, Net Zero Aviation Carbon Emission, 2023

2. DISCUSSION

2.1. Existing IFATCA **ATS 3.20** policy is:

In the operation, maintenance and development of the ATM system when balancing the requirements of safety, efficiency and the environment, the level of safety shall always be maintained or improved.

In case environmentally driven procedures are introduced in the ATM System, these shall be introduced taking into consideration the increased complexity for the controller. This complexity shall be managed at the appropriate, strategic, level. A trade-off between environment and capacity shall be considered as part of this management of complexity, as safety is paramount.

Individual environmental aspects shall be considered by an ATM environmental management system and documented in an ATM environment case as part of an overall performance case.

Provisions for an ATM environment management system should comprise at least the following requirements:

- **Ensure that the level of safety shall be maintained or improved when environmentally-driven procedures are introduced;**
- **Ensure that all individual environmental factors are identified and considered while establishing procedures;**
- **The actual values (noise levels, fuel consumption and the amount of emissions) of the various individual environmental contributors of new or existing procedures should be established in detail for transparency reasons;**
- **The interrelation of the various individual environmental factors should be identified and addressed.**

Provisions for an environment case should comprise at least the following requirements:

- **An environment case is a documented body of evidence that provides argument that a certain procedure is optimized for all individual environmental factors as prioritized by the appropriate authorities;**
- **An environment case should provide a detailed overview to the appropriate authorities for the determination of priorities of the individual environmental factors on a strategic level.**

2.2. Technical and Operational aspects in Air Traffic management (ATM).

2.2.1. The necessary actions that can and must be put in place in the field of ATM can be divided into two main groups: Aerodrome Operations and En-Route Operations.

2.2.1.1. Aerodrome Operations: the general goal is the optimisation of surface movement management in order to create an efficient airport operation system to reduce the environmental impact, in close collaboration with airport operators. This is possible through the introduction of new technologies and procedures that can:

- Reduce emissions during stand, push back and taxiing operations, using systems and vehicles that are powered by alternative energy sources.
  For example, the use of tow trucks for the aircraft management in the apron and taxiway areas can be a possible solution;
- Optimise the airport information system to provide continuous updated information to all stakeholder regarding the flights, with special attention to handling services, updated Expected Off Block Times (EOBT), taxiing sequence etc.;
- Enhance the departing and arriving traffic management through the use of appropriate infrastructures, technological systems and operational procedures in order to reduce waiting times, possible go-around actions, congestion situations, and to allow Continuous Climb Operations (CCO) after take-off and Continuous Descent Operations (CDO) during landing.

2.2.1.2. En-Route Operations: the benefits that can derive from a better use of the airspace and a more efficient management of flights are considered fundamental for the achievement of the new environmental targets. The necessary changes can be obtained through the introduction of new technologies and operational procedures which can be summarised in:

- Flight level and route assignment: sometimes the best flight level or routing for the optimal flight profile is different from the one indicated in the flight plan, so the assignment of a different level or route based on pilot's tactical request can result in significant reduction in fuel burning and flying time;
- Free speed and direct route: giving the possibility to use free parameters in terms of speed can help to reduce fuel burn allowing pilots to adhere more correctly to the aircraft performance profile, while the use of direct routes can be positive both on fuel and time aspects;
- Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO): the reduction of step climbs/descents can represent a useful way for the reduction of CO_2 and noise emission, thanks to the use of procedure and technologies that can optimise the departure/arrival phase and provide better flight trajectories;
- Accurate flight trajectories and sequencing: the adoption of systems that can provide reliable and correct information regarding the arrival and departure flow can allow to plan a more precise flight management. The use of optimised standard procedures instead of radar vectoring or non-standard operations can lower the risk of go-arounds for arrivals or long waiting times before take-off clearance for departing traffic, or rather reduce delays;
- Sustainable Ocean Track: the use of new technologies and separation minima should also allow the implementation of new and more efficient oceanic routes, optimising flight paths and increasing capacity;
- Use of alternate airports: the use of smaller airports has been always penalised by the lack of navigation infrastructures (ILS, VOR, NDB etc.) which are very expensive to install and maintain. Nowadays the existence of other flying means of navigation like Performance Based Navigation procedures (PBN) can represent a solution to add value to smaller airfields, that can be used for point-to-point flights, and reduce congestion in other airports, with the possibility of noise and pollution abatement in some metropolitan areas;
- Higher Airspace Operations (HAO): the use of new types of aircraft is modifying the concept of the use of the airspace; In the future there will be more and more aircraft flying higher than FL 600, thus requesting new rules and harmonisation at global level for the management of this part of the airspace.
- Trajectory Based Operations (TBO): enhanced sharing of information from the flight deck to ATC centres and vice versa.

2.2.2. The realisation of all these new sustainable procedures and operations requires, as previously mentioned, the introduction of new technologies that can provide the necessary tools and environment for their implementation and the achievement of the future targets.

2.2.3. Special attention is put on the utilisation of modern infrastructures, systems and equipment that can reduce workload, operational bottlenecks and increase safety, such as CPDLC, PBN procedures, ADS-B/C, ATFM systems and Satellite-based Augmentation System (SBAS), etc.

2.2.4. ICAO requests all regions and states to plan and implement the necessary actions in order to make this change possible at global level, providing direction through two main documents: the ICAO Global Air Traffic Management Operational Concept (Doc 9854) and the Global Air Navigation Plan (Doc. 9750).

2.2.5. In addition, in order to achieve the expected environmental benefits, other documents provide guidance to member states, such as the Manual on Air Traffic Management System Requirements (Doc 9882) which describes the future of ATM and its functional evolution, and the Manual on Global Performance of the Air Navigation System (Doc 9883) which indicates the path to transition to the new systems with special attention to the planning of services and facilities towards a performance based approach operational concept.

2.2.6. To help guide aviation stakeholders (industry organisations, States, aircraft operators, air navigation services providers) minimise fuel use and reduce emissions, ICAO published in 2014 the manual of Operational Opportunities to Reduce Fuel Burn and Emissions (Doc 10013).

2.3. Professional and Legal aspects of Environmental Air Traffic management (ATM)

2.3.1. ICAO has stated that through the LTAG, they will not attribute specific obligations or commitments in terms of meeting emission reductions to specific states (ICAO). States will remain responsible for setting their own emission reduction targets that are in line with their own reality and capabilities to meet ICAO's LTAG. States may also have their own legal requirements to meet in terms of emission reduction targets.

2.3.2. **Environmental Management Systems (EMS)**

2.3.2.1. EMS is analogous with Safety Management Systems (SMS) and Quality Management Systems (QMS).

2.3.2.2. EMS does more than just enable an organisation to reduce its environmental impacts and increase its operating efficiency. EMS will guide the organisation to achieving compliance with legislated environmental requirements by identifying, evaluating, managing and continually improving its environmental performance. If implemented correctly the EMS will provide the organisation with continual environmental improvements through scheduled objectives and targets which are monitored and updated regularly. The EMS promotes environmental awareness, stewardship, and ownership of impacts (Aucamp, 2021).

2.3.2.3. The establishment of an Environmental Management System using data driven targets will support ANSPs in managing environmental impacts resulting from ATM initiatives and operations. EMS supports the tracking of compliance with legislated emission targets if these are relevant.

2.3.2.4. United States Environmental Protection Agency (EPA) (2023), states that benefits of an EMS for an organisation include improved environmental performance, enhanced compliance of legal requirements, increased efficiency and increased employee awareness around environmental issues.

2.3.2.5. By implementing an EMS an organisation is working towards protecting its employees, the public and the environment by continued improvement of health and safety standards and reducing the amount of pollution.

2.3.2.6. According to the United States Environmental Protection Agency (EPA) (2023) EMS has the following basic components:

- Setting the organisation's environmental goals.
- Analysing the organisation's environmental impacts and legal obligations.
- Setting organisational environmental targets to reduce environmental impacts and comply with legal requirements.
- Implementing programs within the organisation to meet the set environmental targets.
- Monitoring and measuring the compliance to the set environmental targets.
- Providing a framework to increase employee environmental awareness.
- Reviewing the entire EMS and making adjustments where necessary to continually improve the organisation's environment performance.

2.3.3. Environmental Assessment

2.3.3.1. ICAO (2014), stated in the Guidance on Environmental Assessment for Proposed Air Traffic Management Operational Changes that the purpose of the document is to provide interested parties with guidance on conducting Environmental Assessments in a sound and informed manner. This statement can be further elaborated on, from the ICAO (2009) Manual on Global Performance of the Air Navigation System where they introduce the concept of a performance-based approach to the air navigation system. The performance-based approach utilises performance driven objectives and targets which rely on facts and data for informed decision making. ATM Operational Changes should be subject to Environmental Assessments as this explicitly addresses the potential environmental impacts that may be associated with the proposed changes. This information can then be utilised in the planning and decision-making stages of the project (UK CAA, 2016).

2.3.3.2. Baseline data obtained during the Environmental Assessment is used so that changes can be accurately assessed during and after the changes are implemented (UK CAA, 2016). This is the foundation of the continuous improvement cycle in an Environmental Management System.

2.3.3.3. ICAO (2014) provides guidance on when Environmental Assessments should be conducted. These instances include ATM operational procedural changes, airspace redesigns or other related changes that are likely to have large or long-lasting impacts on the environment (ICAO, 2014).

2.3.4. **ATM Environmental Performance Monitoring**

2.3.4.1. Environmental monitoring is a crucial element in realising environmental performance goals. Environmental monitoring in terms of ANSP environmental performance can examine noise around airports, emissions from aircraft engines on the ground (where local air quality emissions are most relevant), and airborne emissions (where horizontal and vertical efficiency of aircraft are most relevant). According to Shine and Lee (2021), to manage the response to environmental impacts that result from introducing environmental mitigating measures discussed above, data driven targets need to be established with clear baselines. These data driven targets are crucial to monitoring, reporting and verifying the effectiveness of the mitigating measures put in place.

2.3.4.2. Due to the global nature of the aviation industry's task to reduce emissions it is vital that there is a unified approach to reducing ATM related environmental impacts. To achieve this goal, standardised metrics will be needed to measure the performance of ATM environmental adaptation initiatives.

2.3.4.3. The most recent Manual on Global Performance of the Air Navigation System Doc 9883 by ICAO (2009) states that there are no globally accepted metrics for environmental performance for ANSPs. The metrics that have been used by some ANSPs include the quantity of emissions that can be attributed to ATM inefficiencies or aircraft fuel efficiency per revenue plane-mile.

2.3.4.4. A study by Reynolds (2009) utilised a lateral efficiency metric and aircraft fuel-based metrics. Reynolds (2009) found that while lateral track efficiency was easier to compute it did not provide enough data on some important environmental performance characteristics. On the other hand, Reynolds (2009) found that fuel-based metrics could provide greater insight on environmental performance characteristics, but that their use involves a greater degree of complexity. ANSPs may experience hesitance from airlines with regards to obtaining fuel burn data, possibly due to protecting sensitive operating information. If the data is shared there may be differences in the granularity of the data from various operators and it may take some time and effort to assimilate the fuel burn data with the ANSPs data.

2.3.4.5. Due to various operational and environmental constraints the actual ground distance flown by the aircraft will vary. These constraints include restricted airspace, airspace capacity, emergency situations and weather. In most cases aircraft may be given lateral track extension to ensure separation or to facilitate Air Traffic Flow Management by vectoring or holding aircraft.

2.3.4.6. Excess fuel-burn metrics obtained from the airlines can be used for greater insight into the efficiency of the ATM system (Reynolds, 2009). Some of the excess fuel-burn can be attributed to inefficiencies in the ATM system. By calculating the difference in the planned fuel-burn for the flight mission and the actual fuel-burn, the excess fuel-burn is derived (Reynolds, 2009). However, in using fuel-burn data there are several caveats that need to be considered. Variances in aircraft payload, choice of cruise level, and the choice of cost index (CI); are all externalities that will affect the fuel-burn of the aircraft, of which the ATM system has no control.

2.3.4.7. According to Reynolds (2009), ATM system flight efficiency metrics can provide insights into where the ATCO and airspace adaptation initiatives must be focused. Efficiency metrics can be validated and greater insights obtained when coupled with excess fuel-burn metrics obtained from the airlines (Reynolds, 2009).

2.3.4.8. The lateral and vertical efficiency of a flight has a direct correlation to the fuel efficiency of the aircraft. Therefore, when considering airborne aircraft, lateral and vertical profile efficiency metrics as a proxy for an environmental metric may prove to be a better fit for ANSPs.

2.3.4.9. Reynolds (2009) calculated the lateral efficiency with the following formula:

$$Efficiency\ Metric\ (\%) = \frac{Actual\ Ground\ Distance - Optimal\ Great\ Circle\ Distance}{Optimal\ Great\ Circle\ Distance} \times 100\%$$

2.3.5. Collaborative Environmental Management

2.3.5.1. EUROCONTROL has introduced a Collaborative Environmental Management (CEM) initiative. The CEM is not intended to replace existing EMS of an organisation but to augment the existing EMSs of the various organisations, with the goal of sharing information to improve the aviation system as a whole. There are several interdependencies at play between ANSPs, airlines and airport operators and it is vital that the environmental programmes put in place are subject to a collaborative decision-making process. This is to ensure that all stakeholders are moving in the same direction for the benefit of improving environmental performance (EUROCONTROL,2021).

2.3.6. Interdependencies and Trade-offs

2.3.6.1. Interdependencies and trade-offs of several Key Performance Areas (KPAs) will need to be considered when conducting Environmental Assessments. The most relevant KPAs for Environmental Assessments include Safety, Environment, Capacity and Efficiency.

2.3.6.2. Where innovative solutions are unable to overcome the need for trade-offs, ICAO calls for a balanced approach to deciding on the outcomes of these trade-offs between various KPAs. ICAO (2014) defines a trade-off as: "…an instrument for choosing the appropriate — that is, the most balanced— solution within a given set of priorities, when different options are available, but each option has different advantages and disadvantages in terms of performance impact…". Safety however will always remain a priority in aviation (ICAO, 2009).

2.3.7. Contrail Avoidance Strategies

2.3.7.1. The last couple of years has seen an increased interest in non-CO_2 emissions from aviation, with a particular focus on persistent contrails.

There is consensus among scientists that persistent contrails have a net warming effect. This has led to increasing pressure to implement contrail avoidance strategies to reduce atmospheric warming. The capability to forecast regions that will lead to persistent contrails forming is not yet mature enough to allow for avoidance strategies to be completed accurately. The differing atmospheric warming temporal scales of persistent contrails and CO_2 also present a challenge in terms of which to prioritise.

See Additional WP: 2025 Contrail Avoidance Strategies (Abu Dhabi 2025).

2.3.8. **The Impact of more efficient operations on capacity**

2.3.8.1. The necessity to improve ATM efficiency for the benefit of environmental performance comes as a double-edged sword. The environmental performance improvement on the one hand and the capacity increase on the other. The increase in capacity when filled will lead to more aircraft therefore more emissions. Will we see regulatory bodies put measures in place that reduce the overall capacity, and when will these come into effect? France has implemented a law which has seen the ban of short-haul flights where a train-alternative of 2.5 hours or less exists, potentially reducing capacity.

2.3.9. **Route optimisation and CDO/CCO**

2.3.9.1. The alteration of routes may lead to reduced track miles for aircraft but may incur a penalty by not being efficient in terms of CDO/CCO. Measuring the horizontal efficiency alone in this case may give the impression that emissions have been reduced. When looking at this scenario holistically it may become apparent that although the aircraft has reduced track miles it now has to fly an inefficient vertical profile. This could lead to an outcome of an overall increase in emissions.

2.3.10. **Human Factors**

2.3.10.1. Key components involved in ensuring an efficient ATM system are technology, operational procedures and training, and how they impact human performance. An improvement or advancement in one or all of these components can lead to gains in efficiency thus reducing environmental impacts.

2.3.10.2. Environmental awareness and operational training for ATCOs with the aim of reducing aircraft fuel burn and emissions is an achievable target that can provide results in the short-term. ICAO, IATA and Eurocontrol have developed reference material for ATCOs on the subject of fuel-efficient control methods.

- IATA: Guidance Material and Best Practices for Fuel and Environmental Management
- ICAO: Doc 10013. Operational Opportunities to Reduce Fuel Burn and Emissions
- Eurocontrol: Continuous descent operations refresher for ATCs https://learningzone.eurocontrol.int/ilp/pages/description.jsf?menuId=1106#/users/@self/catalogues/232380/courses/20793607/description

2.3.10.3. Due to the nature of some of the environmental impact mitigating initiatives, ATCOs may experience a change in current operating practices.

2.3.10.4. The introduction of suitable mitigating measures to limit the increased ATCO workload will be vital, if capacity and efficiency are to remain unchanged. As an example, it may be possible, to a certain extent, to achieve a CCO or CDO by adapting the ATCO controlling style (using vectors to achieve sufficient lateral separation to enable the CCO and/or CDO). However, by employing this same concept in a strategic manner through the development of procedures that enable CCO and CDO by design will facilitate fuel-efficient operations while minimizing ATCO workload. These PBN procedures are designed in a way that enables CCO and CDO with integrated vertical separation, thus reducing the ATCO's workload.

2.3.10.5. ATCOs will need support from technological advancements and fuel-burn optimised procedures in order to fully realise the needed environmental performance adaptations.

2.3.10.6. It will be imperative that suitable metrics are in place to ascertain if these improvements or advancements perform as expected. This can be achieved through the continuous improvement cycle in EMS. Monitoring, measuring and reporting data in such a way that the system continuously assesses the performance of the adaptation or mitigation strategies put in place.

3. CONCLUSION

3.1. Aviation is responsible for 2.0% of global emissions driving climate change. The Intergovernmental Panel on Climate Change (IPCC) (1999), has suggested that improvements in ATM could result in fuel efficiency improvements of between 6-12%. Managing aspects of enhanced aircraft ground management, and en-route optimisation strategies such as CCO/CDO, flight level optimisation and route optimisation can result in reducing emissions (CO_2 and non-CO_2). Managing ATM environmental aspects and impacts will require the use of a systematic approach, while also considering a collaborative effort with key stakeholders. While considering the interests of several KPAs, the objective of safety will always remain a top priority and must never be allowed to be compromised.

4. DRAFT RECOMMENDATIONS

4.1. It is recommended that the existing policy be amended.

IFATCA TPM (20XX), ATS 3.20 – Environmental Issues in ATM
Proposal: In the operation, maintenance and development of the ATM system when balancing the requirements of safety, capacity, efficiency and the environment, the level of safety shall always be maintained or improved, as safety is paramount.

~~In case~~ Before environmentally driven procedures are introduced in the ATM system, the increased complexity for the controller shall be taken into consideration. This complexity shall be managed at the appropriate, strategic, level. ~~A trade-off between environment and capacity shall be considered as part of this management of complexity, as safety is paramount~~.

~~Individual environmental aspects shall be considered by an ATM environmental management system and documented in an ATM environmental case as part of an overall performance case.~~

Provisions for an ATM Environmental Management System should comprise at least the following requirements:

- ~~Ensure that the level of safety shall be maintained or improved when environmentally-driven procedures are introduced;~~
- An environmental policy is implemented with specific environmental goals;
- Appropriate Environmental Assessments are conducted for proposed Air Traffic Management Operational Changes;
- A performance-based approach is utilised;
- ~~Ensure that all individual environmental factors are identified and considered while establishing procedures;~~
- ~~The actual values (noise levels, fuel consumption and the amount of emissions) of the various individual environmental contributors of new or existing procedures should be established in detail for transparency reasons;~~
- Appropriate environmental metrics are used in decision making and are transparently reported;
- The interrelation of the various individual environmental factors should be identified and addressed;
- ANS/ATM personnel receive ATM specific environmental awareness training including aircraft fuel efficiency initiatives;
- The Continuous improvement cycle model is used;
- Collaborative Environmental Management is implemented.

Provisions for an environmental ~~case~~ assessment should comprise at least the following requirements:

- ~~An environmental case is a documented body of evidence that provides argument that a certain procedure is optimized for all individual environmental factors as prioritized by the appropriate authorities;~~
- ~~An environmental case should provide a detailed overview to the appropriate authorities for the determination of priorities of the individual environmental factors on a strategic level.~~
- An Environmental Assessment is conducted for any ATM procedural changes, airspace redesigns or other similar changes that are believed to have significant and long-term environmental impacts;

- The appropriate level of Environmental Assessment is conducted for the scope of proposed changes;
- All individual environmental aspects and impacts are identified and considered while establishing procedures;
- A performance-based approach is utilised during the assessment process;
- Interdependencies and trade-offs between various KPAs are suitably balanced, with safety always remaining as a top priority;
- A detailed report comprising the methodology used, results and decisions reached.

~~An environmental case should provide a detailed overview to the appropriate authorities for the determination of priorities of the individual environmental factors on a strategic level.~~

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