


The Guide to GreenATM Accreditation



A Manual for the CANSO
Environmental Accreditation
Programme

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ACKNOWLEDGEMENTS

The GreenATM Accreditation Programme was developed by a subgroup of the CANSO Environment Workgroup. CANSO would like to thank the experts who contributed to its development and the ANSPs who participated as trial participants to help refine and improve the programme.

- > If you wish to participate in GreenATM, would like further information, or have questions regarding the programme then please contact:

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CONTENTS

1. INTRODUCTION	4
1.1 What is the GreenATM programme?	4
1.2 Why the GreenATM programme is needed?	4
1.3 Benefits of the programme	5
2. HOW DOES THE PROGRAMME WORK?	6
2.1 Accreditation Levels	6
2.2 Structure of the Programme	7
2.3 Categories and Topics	7
2.4 Scoring	8
2.5 Accreditation Validity	9
2.6 Fees	9
3. HOW TO PARTICIPATE IN THE GreenATM PROGRAMME	10
3.1 Accreditation Process	10
3.2 Requesting the Questionnaire	11
3.3 Completing the Questionnaire	11
3.4 Evidence for Submission	11
3.5 Submitting the Completed Questionnaire and Evidence	12
3.6 Recognition for 3rd Party Accreditations	12
3.7 Trial Participation	12
4. GreenATM CATEGORIES AND TOPICS	13
4.1 Governance Category	13
4.2 Improved ATM Category	18
4.3 Infrastructure and Utilities	33
4.4 Other Environmental	38
5. CONTACT US	43
6. ANNEX 1	44
6.1 Questionnaire Response Examples	44

1. INTRODUCTION

1.1 What is the GreenATM programme?

The CANSO GreenATM Programme is an environmental accreditation program that provides air navigation service providers (ANSPs) with an independent, industry endorsed, accreditation of their environmental efforts. Through the programme, ANSPs are assessed with respect to their direct environmental impact, as well as their efforts to facilitate the reduction of emissions by airspace users.

Through the GreenATM Programme application, ANSPs answer a series of questions on a broad range of topics and provide evidence on how they are playing a part in aviation sustainability. The application covers topics related to governance and policy, ground, terminal and enroute operations, infrastructure, and procurement practices among others.

The programme's topics and five accreditation levels can serve as a valuable guide for ANSPs looking to improve their environmental and sustainability performance and for dialogue with ATM stakeholders on critical sustainability issues.

1.2 Why the GreenATM programme is needed?

The Intergovernmental Panel on Climate Change (IPCC) has repeatedly sounded the alarm regarding the need to severely reduce global carbon emissions to limit the rise in global temperatures to 1.5 degrees Celsius. While aviation is a small percentage of global emissions, representing approximately 2.1% of human induced carbon dioxide CO₂, aviation emissions have been growing, reaching a peak in 2019 prior to the COVID-19 pandemic.

In October 2022, at the ICAO Assembly¹, it was collectively agreed to cooperate on a Long-Term Aspirational Goal for aviation to achieve net-zero carbon emissions by 2050; a target that the aviation industry had already committed to the previous year. Achieving this challenging goal will require collective effort to maximise use of all the solutions available such as technology, alternative fuels, improvements to operations and infrastructure, and out of sector measures such as carbon capture and offsetting.

All partners in the aviation sector are facing increasing demands to do more and sooner, to limit the sector's impact on the environment and climate change. While achieving net zero will require a significant energy transition and the ramp up of sustainable fuel production and other fuel alternatives as well as new aircraft technologies, the good news is that there are things we can do today. Studies have identified that efficiency improvements in airspace management and operations could deliver a 6-10% reduction in aviation emissions². The earlier these efficiency gains can be



made the greater the cumulative benefits for the climate.

Many of the ATM solutions necessary to deliver a sizable efficiency gain already exist. However, we need to deploy current solutions and best practice on a wider scale. The GreenATM Programme is designed to highlight positive action being taken, raise awareness and drive improved environmental performance.

While there are a variety of programmes which offer frameworks or standards with which a company can align their environmental activities, none fit the unique nature of the services and operation of an ANSP.

The CANSO GreenATM Programme draws on objectives and strengths of other accreditation or certification schemes, such as the Science Based Targets Initiative (SBTI), the International Organization for Standardization (ISO), Global Reporting Initiative (GRI), and Sustainability Accounting Standards Board (SASB). But as a programme uniquely designed for ANSPs, GreenATM is specific to the structural, organisational, and operational environment of ANSPs and focusses specifically on areas in which an ANSP can positively influence emissions and other environmental factors. In doing so, the program provides a useful guide to support the advancing maturity of ANSPs environmental actions.

ANSP can and have participated in other available

¹ <https://www.icao.int/Newsroom/Pages/States-adopts-netzero-2050-aspirational-goal-for-international-flight-operations.aspx>

² Waypoint 2050 and ICAO LTAG report

generic programmes, such as those identified above, but many have found them to not be well suited for aspects of the air navigation industry that are unique. The GreenATM Programme has been specifically designed to consider that uniqueness and to assess fairly an ANSPs environmental programmes, and the maturity of their efforts across a broad range of actions as to how they facilitate airspace users to reduce emissions and their own direct environmental footprint.

For an ANSP, Scope 1 direct emissions from owned or controlled sources, and Scope 2 indirect emissions from the generation of purchased electricity, steam, heating, and cooling, are often less important than Scope 3, all other indirect emissions that occur in a company's value chain, such as the emissions influenced through the management of the airspace for which they are responsible. The CANSO GreenATM programme was designed by the ATM industry to recognise the atypical nature of the air navigation domain and to promote increased environmental action by ANSPs.

1.3 Benefits of the programme

The GreenATM Programme is an objective validation of an ANSPs efforts to increase their sustainability and environmental management, in a way that will enhance their credibility with their customers, regulators, elected officials, investors, and the public. By participating in the programme, an ANSP receives an objective benchmark of how their environmental actions compare to the actions being undertaken by their peer ANSPs.

The programme has been designed to meet the needs of small and large ANSPs and can be adapted in circumstances where the ANSPs area of responsibility varies.

By highlighting the areas in which an ANSP can positively influence its own environmental footprint and that of its customers, the programme provides a framework for engagement with stakeholders and employees on climate action, which can help to identify priorities, and stimulate additional future activity.

The programme facilitates an understanding of what ANSPs can do to reduce emissions emitted by aircraft operators, coupled with improving their own environmental footprint. This encompasses all aspects of the ANSP, enabling improvements to be identified, whilst also highlighting possible areas that an ANSP may not have previously considered. In that way the programme emphasises and stimulates a path for ANSP's to continuously improve and mature.

As participation in the accreditation programme grows, the identification and visibility of best practices will increase, allowing for shared learning across the industry. This is important, as it will inspire coordinated action between ANSPs to enable a delivery of initiatives that benefit the environment greatly. Additionally, updates to the GreenATM questionnaire over time, as technology, procedures, and scientific understanding advance, will enable the program to continue to reflect best practices.

The programme has been designed to be transparent, adding assurance, objectivity, and robustness when recognising and acknowledging ANSPs efforts and achievements. Joining the programme will showcase the ANSP's positive initiatives and the beneficial impacts it is making, whilst highlighting the ANSPs efforts to continuously improve their environmental standing.



2. HOW DOES THE PROGRAMME WORK?

2.1 Accreditation Levels

The structure of the GreenATM programme has been built upon the levels recognised in maturity models, such as the well-known CANSO Standards of Excellence in Safety Management Systems and Cyber Security. This is appropriate as the programme aims to recognise the maturity of an ANSP's efforts to manage environmental impacts across a broad range of topics.

These maturity models have five levels as shown in Figure 1.



Figure 1. CANSO Standards of Excellence, 5 Levels of accreditation

Level 1 recognises the early stages of environmental and sustainability consciousness and action within the organisation. At this stage the organisation is aware and acknowledges that by changing business policies and practices they can reduce the environmental impacts of the ANSP directly and those of airspace users. Some positive action is occurring in specific areas but isn't coordinated as part of a larger strategy of environmental and sustainability focused corporate activities.

Level 2 is where an ANSP has or is preparing strategies and implementation plans for initiatives that will reduce their environmental footprint and that of their customers. At Level 2 planning is evident and processes are becoming defined but are not yet fully documented or consistently applied. There may be more ad-hoc initiatives and positive environmental activities on-going across the organisation, commenced by local staff, but without formal funding and organisation-wide coordination.

Level 3 indicates that the ANSP's environmental management activities have reached a level of maturity at which plans are actively being implemented across the organisation. New sustainable practices and processes may not be implemented everywhere yet nor embedded to the point where the new culture and behaviours are automatic and sub-conscious. Activity continues to be dependent on individual efforts and there is no expectation that environmental performance

is yet being measured or that benefits realisation is being analysed.

Level 4 will be awarded to ANSPs that have successfully implemented environmental sustainability measures broadly in airspace for which they are responsible and in their workplace. ANSPs at Level 4 have also implemented active monitoring, verification, and measurement processes to drive improvement.

Level 5 recognises the highest level of environmental maturity, and ANSPs achieving this level will be industry leaders and beacons of best practice. ANSPs will have fully implemented numerous strategies to positively influence their environmental footprint and be actively looking for new initiatives and improvements within existing activities through their involvement in research or trials. They also take a principled view of transparency with respect to their environmental performance and publish results, including metrics, on a regular basis to highlight to the industry, stakeholders, and the public the positive impact the organisation is making and where it is continuing to focus its efforts.

ANSP's participating in the GreenATM Programme will be accredited at a single level. The awarded level will be a "weighted average" of achievement across the four categories that will be introduced in the upcoming sections within this document.

As with other maturity models, there is no wrong level. It is recognised that ANSPs will be at different stages on their path to sustainability and that accreditation levels awarded will vary. For ANSPs at all levels, the program will highlight actions and activities that will further augment their environmental programs.



2.2 Structure of the Programme

The GreenATM Programme is structured along Categories, Topics, and Maturity Levels (see Figure 2). Categories represent areas of environmental action, and each category encompasses numerous topics. Topics are defined across five maturity levels.

Each topic has an objective which has been defined and a requirement statement specified for each of the five maturity levels. Questions and supporting guidance have been prepared to assist participating ANSPs understanding of the topic's maturity level requirement and suggested documentary evidence examples are provided.

An ANSP's level of maturity is likely to be different for the different topics, e.g., an ANSP may be a Level 4 on one topic and Level 2 on another. ANSP's will be accredited at a single level based on the number of points awarded at each level.

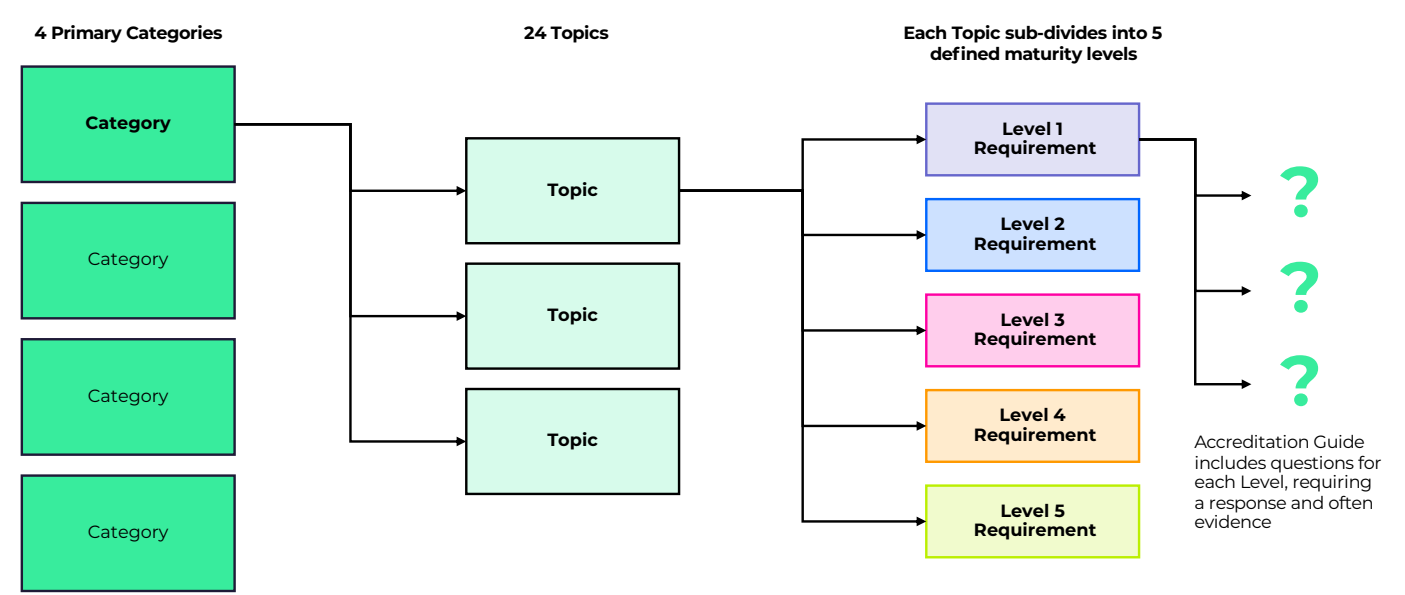


Figure 2. Accreditation scheme structure

2.3 Categories and Topics

Figure 3 below shows the topics in each of the four categories.

GOVERNANCE <ul style="list-style-type: none">Policy & planEnvironmental Management SystemEnvironmental cultureEnvironmental targets	IMPROVED ATM <ul style="list-style-type: none">Flexible Use of Airspace (FUA)Meteorological informationImproved surveillance coverageAirport – Collaborative Decision MakingSurface managementContinuous Climb Operation (CCO)Continuous Descent Operations (CDO)Performance Based Navigation (PBN)Wake turbulence optimisationTrajectory OptimisationAir Traffic Flow Management (ATFM)Research & Development
INFRASTRUCTURE & UTILITIES <ul style="list-style-type: none">Energy managementPower procurement and productionCNS RationalisationCNS Flight Inspection	
OTHER <ul style="list-style-type: none">Sustainable procurementAirport/Community relationsAirspace change managementMobility management	

Figure 3: Categories and topics

More information on the topics and how they contribute to environmental benefit can be found in Section 4 of this Guide.

2.4 Scoring

Each of the 24 topics in the GreenATM Programme is worth a specific number of points. The number of points varies depending on several factors, including the environmental benefit that a high level of action on that topic can realise. This encourages ANSPs to establish broad programs that balance activities across several categories, while recognising and incentivising a high level of action in those areas that promise to deliver the greatest environmental benefits.

The accreditation level awarded to an ANSP is based upon the total number of points awarded across all topics. Figure 3 highlights how the points are split between the categories and how the individual topics within the categories contribute to the final category score.

Allocation of points by category and topic

GOVERNANCE	CATEGORY POINTS	POINTS AVAILABLE PER TOPIC PER LEVEL
Policy & plan	12	3
Environmental Management System		3
Environmental culture		4
Environmental targets		2

IMPROVED ATM	CATEGORY POINTS	POINTS AVAILABLE PER TOPIC PER LEVEL
Flexible Use of Airspace (FUA)	65	7
Meteorological Information		4
Improved surveillance coverage		7
Airport – Collaborative Decision Making (A-CDM)		3
Surface Movement		4
Continuous Climb Operations (CCO)		4
Continuous Descent Operations (CDO)		6
Performance-Based Navigation (PBN)		7
Wake turbulence optimisation		3
Trajectory Optimisation		7
Air Traffic Flow Management		7
Research & Development		6

INFRASTRUCTURE & UTILITIES	CATEGORY POINTS	POINTS AVAILABLE PER TOPIC PER LEVEL
Energy management	14	4
Power procurement and production		5
CNS Rationalisation		3
CNS Flight Inspection		2

OTHER	CATEGORY POINTS	POINTS AVAILABLE PER TOPIC PER LEVEL
Sustainable procurement	9	2
Airport/community relations		2
Airspace change management		2
Mobility management		3

Figure 3. Categories and topics

With transparency as to requirements across the levels and the availability of points per topic it is expected that ANSPs in completing the questionnaire will have a good understanding at the time of submission as to which Level they are likely seeking. Eighty out of a possible 100 points is necessary to be accredited at each level.

Please note that points awarded at a higher level can flow down the scheme and be used to supplement the score at a lower level. But excess points awarded at a lower level cannot flow up the scheme. This means that if the ANSP scores 20 points at Level 4 and only 65 at Level 3, then 15 of the Level 4 points can be applied to achieve the Level 3 accreditation (65 + 15 = 80), see Figure 4. Whereas, if the ANSP was to score 100 points at Level 1 and only 60 points at Level 2, the extra points scored at Level 1 cannot be used to cover the gap at Level 2. Therefore, in this scenario, Level 1 accreditation would be awarded, see Figure 5.



Figure 4. Scoring example – flow-down of points



Figure 5. Scoring example – points cannot flow upwards

The accreditation scheme has been designed to recognise that different ANSPs have different accountabilities, hence the scoring has been made flexible to accommodate this. If an ANSP can demonstrate they do not have accountability for a particular topic, such as meteorology or enroute services as examples, then points for those topics will be reallocated within the same category to maintain the overall balance of the programme. Please note that points are only reallocated if the ANSP can demonstrate they do not have accountability for the topic, or the topic has no place within their operation. Just leaving a topic unanswered will score 0 points. For points to be reallocated, there must be clear evidence provided by the ANSP to show that the topic is not within their scope of services and operations and is therefore not applicable.

2.5 Accreditation Validity

The awarding of an accredited level is good for one to three years depending on circumstance as described below.

In the first year, ANSPs must complete the full questionnaire up to and including the levels they believe apply to their activities.

Once they have been awarded an accreditation level, in the following year they may complete a streamlined Renewal Application, providing evidence of continuation of program activities. Once an ANSP has been successfully accredited for three consecutive years their accreditation at that level becomes valid for three years, enabling them to reduce the frequency with which they submit.

If an ANSP wishes to apply for assessment at a higher level of accreditation than they currently hold, they must complete the initial accreditation application providing evidence for the higher level and pay the full assessment fee.

An ANSP's scores for individual topics or categories will not be published but will be available to the ANSP in the report on their assessment. Only the overall accreditation level awarded will be made public.

While their accreditation remains valid, ANSPs will be able to use the appropriate GreenATM logo on their website and in other materials to demonstrate their accomplishment.



2.6 Fees

CANSO is administering the GreenATM Programme on a cost recovery basis.

Application fees have been set at a level necessary to cover programme costs and have been structured in consideration of both the accreditation Level being sought and the size of the ANSP applying. Fees increase in accordance with the Level being sought because at higher levels the workload for the evaluation undertaken by the Secretariat increases as more material is assessed to justify achievement at higher levels and more complex concepts are being validated. Submissions by larger ANSPs will also require more

workload to assess than those of smaller ANSPs.

Non-members of CANSO wishing to participate in the scheme are welcome but will be charged the non-Member fee which will incur a 25% surcharge on top of the CANSO member fee.

Application fees are due upon submission of the completed questionnaire. Evaluation of the questionnaire will not commence until the application fee has been paid. Invoices will be issued by CANSO upon receipt of questionnaire submissions.

Figure 6 below provides the accreditation fees applicable and Figure 7 provides the fees applicable in renewal years.

Accreditation fees for CANSO Members

LEVEL SOUGHT	SIZE OF ANSP – ANNUAL ATM REVENUE (USD) ³		
	LESS THAN \$100M	\$100M – \$250M	GREATER THAN \$250M
1 or 2	€ 17,405	€ 21,240	€ 23,895
3	€ 25,370	€ 28,910	€ 32,155
4 or 5	€ 32,745	€ 38,350	€ 41,890

Figure 6.

Renewal accreditation fees for CANSO Members

LEVEL SOUGHT	SIZE OF ANSP – ANNUAL ATM REVENUE (USD)		
	LESS THAN \$100M	\$100M – \$250M	GREATER THAN \$250M
1 or 2	€ 13,865	€ 17,700	€ 18,585
3	€ 16,520	€ 19,175	€ 20,945
4 or 5	€ 17,110	€ 20,650	€ 22,420

Figure 7.

If an ANSP pays for one level of accreditation but following evaluation gains greater than 80 points at a higher level, the ANSP will have the opportunity to pay the difference in evaluation fee, if applicable, to enable accreditation at the higher level. If the option to pay the differential is declined, then the original level indicated by the ANSP at the point of submission will be awarded. If during evaluation an ANSP fails to secure sufficient points for the accreditation level they were seeking, then there will be no reduction in fee, as the evaluation will require at least the same level of effort.

3 A copy of a recent financial statement or annual account may be requested to verify the appropriate invoicing

3. HOW TO PARTICIPATE IN THE GreenATM PROGRAMME

3.1 Accreditation Process

The full accreditation process is highlighted in Figure 8, which illustrates the key process steps and the time frames involved in relation to completing the questionnaire, evaluation of the submission by the programme secretariat, review, and confirmation by the CANSO Accreditation Panel.

The CANSO Accreditation Panel is a 5-member body appointed by CANSO and shall comprise the following membership:

- CANSO Executive Committee Environmental Champion
- Co-chairs of the CANSO Environment Workgroup
- A CANSO staff member (Director Programmes, Operations Programme Manager or other)
- A Director General or equivalent from one of the CANSO regions not already represented on the Panel.

The Panel's accountabilities are:

- Ownership, management, and updates to the accreditation programme.
- Managing an independent Accreditation Programme Secretariat.
- Deciding, based on the assessment recommendation provided by the Secretariat, on the accreditation level to be awarded.

The Secretariat is a third party contracted to CANSO who are:

- Accountable to the Chair of the Accreditation Panel.
- Responsible for the day-to-day management and operation of the accreditation programme.
- The recipient and evaluator of ANSPs accreditation submissions.
- Required to make a recommendation to the Accreditation Panel based on the evaluation of the

submission as to the appropriate level to be awarded.

- Responsible for preparing an evaluation report for each submission received.

As evident within Figure 8, there are three main stages within the process. The first stage is where the ANSP expresses interest in accreditation. Once the request has been made, they will be sent a questionnaire and guidance material. The ANSP then completes the questionnaire and gathers documents and other evidence to support their answers.

Once completed, the ANSP submits their accreditation application. The programme fee is due at this point. Please note, there is no set timeline on when the ANSP must submit the questionnaire. You can take as long as required to complete the accreditation application and can submit at any time in the year. The complete questionnaire and evidence are to be submitted to the Secretariat.

Stage 2 will take approximately three months from the date at which submissions are complete. During this period the initial review commences which will be followed by several workshops. The first being a clarification workshop at which the assessors can ask questions of clarification such as requesting further explanation or evidence to support the submission; the second workshop will be focussed on discussion of the provisional accreditation scoring. The logic for discussing the provisional scoring is to ensure the ANSP has a chance to identify if the assessors have misinterpreted any of the justifications or evidence submitted. Once the workshops are complete, the provisional accreditation scoring will be finalised, with a report and accreditation recommendations being prepared for the CANSO Accreditation Panel.

During the third and final stage of the accreditation process the CANSO Accreditation Panel meets. Following the Panel meeting the accreditation decision will be communicated to the ANSP and an accreditation feedback report will be provided. The feedback report will provide both an outline of the rationale for awarding the Level/score by topic as well as guidance on what actions the ANSP would need to have completed to achieve the next level.

CANSO will hold an award ceremony at least once per year at which ANSPs accredited that year will be formally awarded their Levels. Award ceremonies may be held more often as circumstances require.

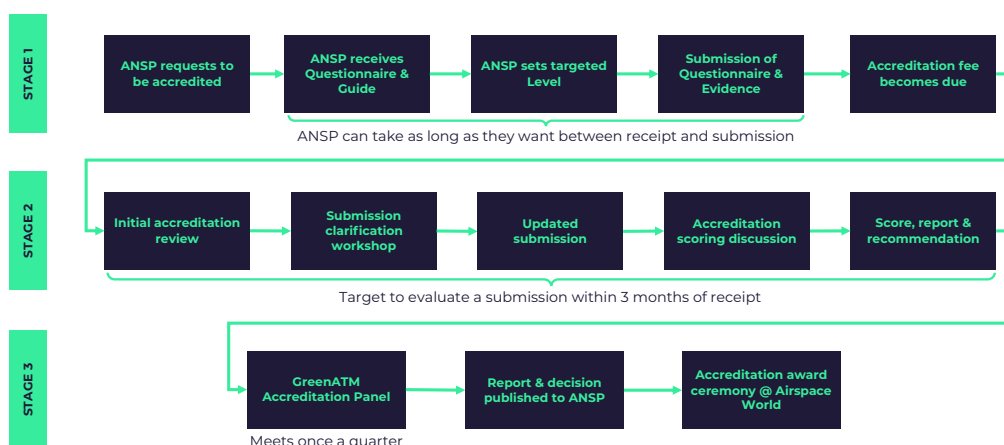


Figure 8. Accreditation process flowchart

3.2 Requesting the Questionnaire

You may request the most up to date version of the GreenATM questionnaire by emailing

- GreenATM@think.aero

3.3 Completing the Questionnaire

Within the questionnaire, each topic has a requirement statement that illustrates what is being evaluated. Each level within that topic has an objective indicating what is expected at that level. Guidance is provided to minimise confusion on the types of evidence required. Please see Figure 10 for an example of the type of questions and guidance provided. In this example the questions are defined for Level 1 maturity within the “Environmental targets” topic which falls within the “Governance” category. “Annex 1” provides selected examples of approaches to answering the level objectives, and examples of types of evidence that could accompany the answers.

When completing the questionnaire, you are requested to start with Level 1 questions and continue up to the highest level at which the requirements can be met. This level will vary across topics. If you prefer, you can answer a level with a detailed answer regarding activities related to that topic instead of answering each individual question, however this may result in less marks being awarded if the answer does not provide clarity that the overall objective of the level is met. Responding to all questions is not a requirement. If a partial answer can be given it should be, as this can lead to points being awarded on that topic.

3.4 Evidence for Submission

ANSP can submit anything as evidence that they believe demonstrates that they have met the topic maturity requirement. Acceptable evidence can include emails, documents, presentations, corporate reports, press releases, meeting minutes, business case assessments etc. Where a lengthy document is submitted ANSPs are requested to indicate where within the document the relevant evidence can be found. This can be done by highlighting certain sections or through reference to page or section numbers. Highlighting the relevant information within the body of the document will enable the review of information to be conducted quicker and more accurately.

The Secretariat, as part of their contract with CANSO, has agreed to confidentiality provisions that ensure that evidence submitted will be held confidential and cannot be used for any purpose other than the evaluation of the submission.

While answers within the questionnaire must be in English, the inclusion of documents and evidence in other languages is accepted. Efforts will be made to adhere to review timelines where this occurs, but there may be some delay needed to accommodate evaluation of documents in additional languages.

GOVERNANCE		Environmental Targets	
Have corporate Environmental Management targets that are scientifically based, monitored and reported against within the organisation and publicly.			
Level 1	Objective	The need for Environmental Management targets has been recognised within the organisation's environmental policy and work is underway to define and set targets.	
QUESTION		GUIDANCE	
1	Does the organisation's environmental policy identify that targets will be set and monitored, if not why not?	Potential evidence: <ul style="list-style-type: none">● Copy of the environmental policy highlighting where the requirement for targets is stated.	
RESPONSE		EVIDENCE	
1			
QUESTION		GUIDANCE	
2	Please explain if the organisation is in the process of setting environmental targets, touching on aspects such as, how the targets will be adopted, the timescales the targets will span, and the business areas that will be covered by the targets?	Potential evidence: <ul style="list-style-type: none">● Draft targets● Definition of scope to be covered by targets● Timeline/plan/strategy for development of targets	
RESPONSE		EVIDENCE	
2			

Figure 9. Snapshot of question from the questionnaire

3.5 Submitting the Completed Questionnaire and Evidence

Once you have completed the questionnaire and compiled all the documentary evidence you need to submit it to the GreenATM Secretariat. The questionnaire and evidence are likely to be large files unable to be easily sent via email. We therefore ask that you email GreenATM@think.aero requesting a dedicated Microsoft Teams site to be created for your organisation, to which you can upload your submission.

If for any reason your organisation's IT policy prevents you from using a Microsoft Teams site then you are welcome to use an alternative method to send us your files, such as an online portal or file sharing site of your choice, or by copying the files to a USB memory stick and posting it to:

GreenATM Secretariat
Think Research Ltd
Branksome Park House
Bourne Valley Road
Poole
Dorset
BH12 1ED
United Kingdom

3.6 Recognition for 3rd Party Accreditations

During the development of the GreenATM programme CANSO explored some of the larger international or aviation industry focused environmental accreditation programmes and reporting schemes, to; understand what already exists; to identify good practice; and to identify potential overlaps.

CANSO recognises that some ANSPs have had environmental, carbon and/or climate impact programmes for some years and have therefore already achieved external accreditations for their commendable efforts. To reduce overlap and duplication CANSO has sought to recognise, where appropriate, existing third-party accreditations within the GreenATM Programme.

ANSPs that hold an ISO 14001 Environmental Management and/or ISO 50001 Energy Management accreditation may receive recognition within appropriate GreenATM topics, including Policy and Plan, Environmental Management System, and Energy Management, by providing evidence of their existing certification, rather than repeating full population of the questionnaire and evidence submission for those topics.

How much recognition GreenATM can offer, in respect to ISO 14001, depends on the breadth of the boundaries defined by the ANSP within their ISO 14001 system. The GreenATM topic Policy and plan, at Level 2, requires an environmental policy that spans the organisation's infrastructure, operation, and services to airspace users. However, ISO 14001 allows an organisation to define the boundaries of its environmental management system, which may or may not align with the requirements of GreenATM. Therefore, if the ISO 14001 scope aligns with GreenATM's requirements then an ANSP holding an

ISO 14001 external accreditation will be awarded level five for the GreenATM Environmental Management System topic. If, however the ISO 14001 scope only encompasses part of that required by GreenATM then the dispensation offered will be limited to a maximum of 60% of the points available, i.e., an externally accredited ISO 14001 EMS that is constrained to just environmental spills will at most only be awarded 60% of the points available within the GreenATM EMS topic.

It is not possible, due to this self-determination of the ISO 14001 scope, to set a blanket level of recognition for those holding external accreditations, but the evaluation undertaken as part of the GreenATM scheme will look to recognise existing accreditations where alignment can be evidenced.

3.7 Trial Participation

ANSPs will be permitted to obtain an assessment of their activities as a trial participant in the program. This will enable them to go through the exercise of filling out their submission and having it assessed while keeping the accreditation score confidential to the organisation. This can help many ANSPs who would benefit from the coaching and learning experience the program provides.

ANSPs participating as trial participants must indicate their intent at the time of submission. Trial participants will pay the full fee and will receive an assessment report which can aid them in their internal review of their sustainability programmes, or in the preparation of future submissions.

ANSPs will only be able to participate as a trial participant a maximum of one time. Following that, it is expected that participating organisations will be committed to transparency in reporting outcomes.

If they submit in the year following their trial, they will be able to pay the renewal fee for their first assessment.

4. GreenATM CATEGORIES AND TOPICS

This section provides details on the GreenATM Categories and the Topics on which the accreditation assessment is based. In each section links to additional resources are provided where they add value to the understanding of the topic and benefits achievable. At the end of each topic section the requirements at each level are outlined. Additional details can be found in the GreenATM Accreditation Questionnaire available upon request by contacting GreenATM@think.aero.

4.1 Governance Category

Having strong governance elements in place ensures an organisation's environmental efforts are effective and permeate all parts of the organisation. Good governance ultimately fosters sustainability, creates sustainable values, and helps companies achieve these values. It ensures employees understand the nature of the commitment and how they contribute to it in their day-to-day work.

The governance category includes four separate topics, and 12 points are available in this category.

- **4.1.1 Environmental Policy and Plan**14
- **4.1.2 Environmental Management System**.....15
- **4.1.3 Environmental Culture**16
- **4.1.4 Environmental Targets**.....17

4.1.1 Environmental Policy and Plan

The environmental policy and plan topic focuses directly on whether the organisation has a corporate environmental policy and a plan associated with it. The aim is that an ANSP will have a policy that is approved at senior levels and a plan that is shared with staff, with the objective to improve the environmental management of the organisations infrastructure, business operations and services to airspace users.

This enables policy and objectives to be fed from the senior levels of the organisation to the relevant staff to be implemented in-line with the latest organisational thinking and best practices.

An environmental policy can be as simple or comprehensive as is appropriate for your organisation.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The need for an environmental policy that sets the aims for how the organisation will improve its environmental management in respect to its business operations, infrastructure and services to airspace users is recognised within the organisation and whilst the policy may not exist yet, there is a commitment to develop one.

Level 2 Objective: There is an environmental policy that is visibly endorsed at senior levels, and it has been communicated to staff. The policy reflects the importance of reducing the environmental impact of the organisation and increasing the environmental performance of the organisations' operation, infrastructure, and services.

Level 3 Objective: The organisation has developed a short to medium term environmental management plan with defined benefits that is aligned with the environmental policy. An assessment has identified the staff and resources necessary for its delivery.

Level 4 Objective: The environmental policy is subject to review, at least once every five years, to ensure it is aligned with the latest thinking and best practices. Senior managers' have environmental accountabilities within their job description and annual performance targets that relate to initiatives that deliver improved environmental performance.

Level 5 Objective: The organisation has successfully delivered on its environmental management policy over a period of at least five years, demonstrated by the initiatives within its environmental management plan having been delivered and the benefits realised.

RESOURCES

14001 Academy

- [How to Write an Environmental Policy](#)

British Assessment Bureau

- [Writing an Environmental Policy](#)

IATA Course

- [Designing an Environmental Strategy Fundamentals](#)

4.1.2 Environmental Management System

Environmental Management System (EMS) is a systematic framework to manage the immediate and long-term environmental impacts of the ANSP's infrastructure, operations and services facilitating the monitoring and management of the environmental impact, including emissions.

Successful implementation of an EMS may include the planning of associated costs, roles, and necessary skills to implement environmental objectives and goals, as well as documented evidence of the programme's audit. At the highest level of achievement on this topic, the EMS system is certified by a third party.

An EMS is effective in aiding ANSPs to:

- Identify environmental risks and issues
- Manage environmental risks and developing effective processes
- Document risk assessments and management plans
- Reduce resource use and optimising cost effectiveness

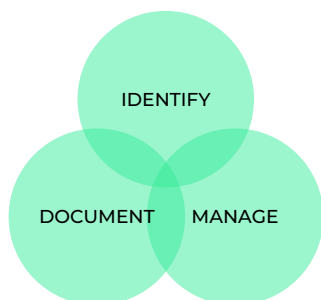


Figure 10. EMS – Identify, Document & Manage risks

The benefits of implementing an EMS include reduced environmental impact, improved efficiency in performance/operations, and easier achievement of legal environmental obligations.

If you already hold ISO 14001 accreditation, please see “3.6 Recognition for 3rd Party Accreditations” of this guide.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The need to implement an EMS is recognised and planning is progressing for its development and implementation.

Level 2 Objective: The environmental aspects of the organisation's operations, infrastructure and service provision have been identified, the impacts generated by those aspects have been ranked, and goals and objectives to mitigate the worst aspects are set.

Level 3 Objective: The associated programme, processes, role descriptions and capabilities necessary for the achievement of the EMS goals and objectives have been identified and an assessment of the associated costs has been completed. A plan exists for the development of new job roles, job descriptions, processes/procedures, and staff capability development.

Level 4 Objective: The EMS ensures the organisation is identifying opportunities for improvement and implementing the actions necessary to achieve the expected results. The organisation identifies and controls its environmental aspects, as well as their impact on the environment. A regular series of audits is undertaken with documentation retained to demonstrate the results of the audit and the management review of the results. The EMS is fully implemented but not certified.

Level 5 Objective: The organisation maintains a third-party certified EMS (e.g.: ISO 14001) and the organisation's environmental performance is published (i.e.: made public).

RESOURCES

CANSO

- [Introduction to Environmental Management Systems \(Best Practice\)](#)

ICAO, DOC 9968

- [Report on Environmental Management System \(EMS\) Practices in the Aviation Sector](#)

US Government Environmental Protection Agency

- [Learn about Environmental Management Systems](#)
- [Guide to Developing an Environmental Management System](#)

IATA Course

- [Environmental Management Systems](#)

ICAO

- [Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes](#), Doc 10031, First Edition, 2014

4.1.3 Environmental Culture

The aim of this topic is to establish the extent to which understanding of, and commitment to, environmental responsibility permeates an organisation. Environmental culture reflects the individual, group and organisational attitudes, norms and behaviours related to minimising the impact of aviation and our collective actions on the environment.

Organisations with strong environmental cultures engage with employees, both operational and non-operational, through effective communication and appropriate training to provide them with the motivation, knowledge, and capabilities necessary to achieve the organisation’s environmental aims and objectives and establish a strong sense of environmental and sustainable responsibility.

At the higher levels of this topic, organisations may be undertaking communications campaigns and training sessions to raise understanding of the company’s environmental policies, and the environmental impacts that staff can mitigate. This may be engagement regarding a recycling campaign, or a bike to work campaign, or regular staff communication regarding environmental performance metrics. Questions aimed at measuring awareness and commitment on environmental issues may be included in regular staff surveys.

Air traffic controller training may be particularly relevant because of the direct impact on aircraft operations, and direct influence on aircraft ground movements, trajectory, speed, and other factors that influence efficiency and fuel burn. While air traffic controllers’ primary responsibility is the safety of operations under their control, enhancing their appreciation and understanding of the factors influencing fuel burn can contribute to improved environmental performance.

At the highest levels of achievement, each employee will understand the company’s environmental commitments and their role in them.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The organisation is aware of its legal requirements in terms of environmental management. There is evidence employees believe that meeting regulatory requirements and following company processes will achieve environmental goals and communication on environmental topics is occurring.

Level 2 Objective: Employees are aware of their environmental roles and responsibilities within their work team. Management recognises it must commit to improving environmental performance. The organisation is developing systems and processes to support employees’ ability to share environmental learning and practices with other teams or groups. The organisation is aware of the need for an improvement plan and periodic assessment of environmental culture.

Level 3 Objective: The organisation trains employees to fulfil their environmental responsibilities. The value of environmental responsibility in the organisation is recognised and promoted. Management’s approach to environmental management demonstrates a genuine commitment to addressing environmental responsibility issues. The organisation assesses its environmental culture and disseminates the results at least once every five years.

Level 4 Objective: The value of environmental responsibility in the organisation is promoted internally and externally (e.g., airspace users, passengers, regulators, elected bodies, public). The organisation actively seeks environmental lessons and best practices (external and internal to the organisation) to improve its environmental standards and practices. Employees are encouraged to bring forward ideas to improve procedures, practices, and people to improve environmental performance. The organisation has developed a plan to address gaps and deficiencies identified during the environmental responsibility assessment. Indicators are used to gauge whether the gaps and deficiencies are effectively addressed.

Level 5 Objective: The organisation has developed best practices in the development, assessment, and continual improvement of an environmental culture. The organisation is actively sharing its best practices and mentoring/coaching other ANSPs in the development of a strong environmental culture.

RESOURCES

- GreenBiz

 - [Five ways to create a strong sustainability culture](#)
- Awake

 - [Sustainability Culture Indicator](#)
- The Conference Board

 - [Building a Sustainability Culture: Six Challenges and Five Guiding Principles to Get Started](#)

4.1.4 Environmental Targets

In addition to an environmental policy, an EMS and strong environmental culture there are benefits to setting corporate environmental targets and monitoring their achievement over time.

Environmental targets may be related to Air Traffic Service (ATS) delivery or to the ANSPs own environmental footprint. Organisations may have one overarching target or a series of targets on several topics. They may relate directly to reducing carbon emissions, or to other environmental benefits (e.g., recycling programs).

Targets help galvanise reduction efforts and encourage innovation and often lead to the identification of additional reduction opportunities. Effective targets include timelines for their achievement.

Declaring your environmental targets publicly and reporting on them publicly are best practices and encourage accountability on the part of the organisation to progress.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The need for environmental targets has been recognised within organisation's environmental policy and work is underway to define and set targets.

Level 2 Objective: Environmental targets have been established and approved, including documented definitions of the target, how they will be measured and clarity on what the baseline is, if relevant.

Level 3 Objective: The organisation has started to measure its progress towards environmental targets. The organisation has identified strategies/programmes for achieving each of its targets. Progress is reported to staff at least once a year.

Level 4 Objective: Progress against targets is reported publicly at least annually with a transparent explanation for changes in progress.

Level 5 Objective: The organisation has a demonstrated record of fulfilling or progressing materially towards its targets. New targets are defined and adopted by the organisation as previous targets are achieved.

4.2 Improved ATM Category

Improved ATM is the largest of the categories in the GreenATM programme. That is because ANSPs can realise significant environmental benefits by providing ATM services in a way that reduces fuel burned by aircraft operating in their airspace.

Analysis by ICAO and the Committee on Aviation Environmental Protection (CAEP) have identified environmental benefits that can be achieved through the advancement of Aviation System Block Upgrades (ASBUs) and through other operational measures⁴. In many instances, the topics below have been aligned with ASBUs at specific accreditation levels, while keeping to capabilities that are currently available.

The improved ATM category includes 12 topics, and 65 points are available in this category.

- **4.2.1 Flexible Use of Airspace (FUA)**19
- **4.2.2 Meteorological Services**20
- **4.2.3 Improved Surveillance**22
- **4.2.4 Airport Collaborative Decision Making**23
- **4.2.5 Surface Management**25
- **4.2.6 Continuous Climb Operations**26
- **4.2.7 Continuous Descent Operations**26
- **4.2.8 Performance Based Navigation (PBN)**27
- **4.2.9 Wake Turbulence Optimisation**29
- **4.2.10 Trajectory Optimisation**30
- **4.2.11 Air Traffic Flow Management (ATFM)**31
- **4.2.12 Research and Development**32

⁴ ICAO [Operational Opportunities to Reduce Fuel Burn and Emissions](#), Doc 10013, First Edition, 2014

4.2.1 Flexible Use of Airspace (FUA)

In simple terms, the FUA concept can be explained to be the sharing of airspace to be utilised by aircraft without civil/military boundary constraints.

ICAO defines FUA to be:

“An airspace management concept based on the principle that airspace should not be designated as purely civil or military, but rather as a continuum in which all user requirements are accommodated to the greatest possible extent.”

EUROCONTROL adds to this definition that:

“Any necessary airspace segregation is temporary, based on real-time usage within a specific time period. Contiguous volumes of airspace are not constrained by national boundaries.”

FUA does not have to be limited to civil/military airspace boundaries, FUA can be applied to any airspace restriction such as parachute drop zones, gliding or aerobatic areas.

The implementation of FUA concepts enable airspace to be utilised as one continuum, to be allocated for use on a day-to-day basis to accommodate user requirements. The aim for introducing the FUA concept was to create more efficient use of the airspace system, established on transparency and due regard to national security needs.

Even though FUA concepts have been around for several years, segregated military airspace continues to contribute to airspace inefficiencies in numerous areas. The process of successfully putting in place FUA requires significant up-front effort and can require a national airspace planning process, Letters Of Agreements (LOAs), a harmonised process for publication, and a more efficient system that enables timely access to restricted airspace.

Depending on the volume and location of existing restricted airspace, the benefits from the FUA concept can be significant and include:

- Increased flight efficiency and reduced environmental impact from a reduction in distance, time, and fuel for civil aircraft
- Establishment of an enhanced ATS route network and associated sectorisation, providing:
 - Increase in airspace capacity
 - Reduction in delays
- Greater efficiency in separation
- Enhanced real-time civil and military co-ordination
- Better use of temporary airspace reservations that are more closely aligned with military operational requirements and improve response to specific military requirements

Without a successful FUA concept, civil aircraft may be required to operate at non-optimum flight levels or on non-optimal trajectories leading to greater track miles, and thus increased excess fuel burn and carbon emissions. Reduced airspace capacity can cause a greater workload for air traffic controllers and in the cockpit, thus inefficient use of time.

Eventually, an Advanced Flexible Use of Airspace (AFUA) concept should replace the original FUA concept and integrate Collaborative Decision Making (CDM) procedures, which introduce performance driven operations based on the management of airspace configurations which supports the use of more flexible and dynamic elements.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness within the organisation of the benefits of FUA. There is a plan to engage with the authorities accountable for restricted airspace to explore opportunities for its flexible use.

Level 2 Objective: Discussions between the ANSP and other stakeholders have occurred. All stakeholders understand the benefits. A consensus on FUA exists as a part of strategic, pre-tactical and tactical airspace management.

Level 3 Objective: The fuel savings/reduced track miles that will be enabled from the shorter routing(s) achievable with FUA at the pre-tactical level have been estimated. Documentation and/or agreements regarding procedures for opening and closing of restricted airspace are being developed. FUA is an active component of service provision with the emphasis still on the strategic airspace management.

Level 4 Objective: Use of tactical FUA enabling the pro-active and dynamic management of airspace in response to specific short-notice airspace requirements and route optimisation. Fuel savings/reduced track miles benefits are tracked on an on-going basis.

Level 5 Objective: There is a seamless, CDM-based, Air Space Management ATFM/ATS process with advanced, real-time management of airspace configurations. Airspace allocation is dynamically updated, and information is constantly being shared between all ATM partners. An active approach to measurement demonstrates clear benefits realisation.

RESOURCES

ICAO

- [Manual on Civil-Military Cooperation in Air Traffic Management \(Doc 10088\) 1st Edition, 2021](#)
- [Flexible Use of Airspace Manual Template](#)

ICAO Circular 330

- [Civil Military Cooperation in Air Traffic Management](#)

ICAO, Presentation

- [Flexible Use of Airspace](#)

SKYbrary

- [Flexible Use of Airspace](#)

ICAO MID Presentation, CAA Sudan

- [What is FUA?](#)

National Aviation University

- [Concept of Advanced Flexible Use of Airspace](#)

EUROCONTROL

- [Advanced Flexible Use of Airspace \(AFUA\) Concept V1.0, September 2015](#)

4.2.2 Meteorological Services

Meteorological (MET) information is a key element of safe flight and effective airspace management. Robust MET information supports enhanced operational efficiency by improving situational awareness, facilitating dynamically optimised flight trajectory planning, and supporting Collaborative Decision Making (CDM) on management of adverse weather events.

In some States the accountability for providing aviation MET services rests with the ANSP while in others the responsibility rests elsewhere and the ANSPs accountability is limited to making MET information available to pilots, as well as effective use of the information in their own operational planning.

The provision of MET information at any scale, from local conditions at an airport; or forecasts for weather within the terminal and enroute sectors; are a key part of flight and airspace management. As our understanding of meteorology has developed and technology has advanced, both the accuracy and timeliness of MET information have improved, enabling safer and more efficient flights.

In scenarios where there is adverse MET conditions enroute, pilots may request to avoid the weather where possible, either by vectoring around the area of weather and/or changing flight levels. This can create significant increases in workload for the air traffic controllers as the capacity of their sector is reduced, and at the same time they are dealing with tactical requests from the pilots which increases coordination with adjacent sectors. However, satellites are now able to identify, track and broadcast accurate convective weather forecasts enabling pilots and dispatchers the ability to strategically plan safe and efficient flight routes rather than relying on tactical manoeuvres once enroute.

In Europe, it has been estimated that 13% of primary delays, 30% of all ATM delays, and 25.5% of delays managed by ATFM are because of disruptive weather. Through the more accurate and timely provision of MET information the impacts can be mitigated but not eliminated. For example, strong headwinds during long-haul flights can significantly extend flight times. Having the winds accurately forecast helps flight planning and may impact fuel uplift but does not eliminate the impact.

The format in which MET information is shared can have an impact on how and when it is used within the flight planning, resource planning and route planning activities. Weather does not recognise international boundaries and with some flights passing through the airspace of many nations there are benefits to the provision of consistently formatted data. Forecast accuracy delivers essential operational information.

Globally interoperable information exchange formats such as the ICAO Meteorological

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: MET information is available and briefed to those in operational ATC positions but there are no formalised operational planning protocols that rely on MET information. There is evidence of ad-hoc communication and collaboration with airspace users and neighbouring ANSPs on management of adverse weather events that may negatively impact capacity.

Level 2 Objective: There are established procedures for integrating MET information into strategic and pre-tactical operational planning activities to improve planning. ATCOs readily have MET information available in the tactical operation to improve situational awareness and decisions. There are agreed procedures, approaches, and defined mitigations for management of adverse weather events with neighbouring ANSPs and major airspace users. All of these have the clear objective of efficient management of flows and the appropriate use of traffic management initiatives.

Level 3 Objective: Meteorological information supports automated ATM decisions or plays an important role in ATM decision support tools. Initiatives have been taken to explore ways of enhancing dissemination of high-fidelity weather forecasts, the production and implementation of new weather products using data-centric MET information and/or to integrate adverse weather planning with airline operations centres.

Level 4 Objective: Operational ATM decisions are optimised and consistent though the digital integration and automatic processing of both planning and tactical MET information. The production and distribution of MET data is predominately utilising the ICAO Meteorological Information Exchange Model (IWXXM) and is starting to use the SWIM environment. Improvements to weather data, forecasting methodology and information dissemination are delivering benefits.

Level 5 Objective: MET information have progressed to a level of accuracy, resolution, and frequency to support ATM operations in high traffic density areas and to optimise flight profiles. Forecasting and warning allows for tactical avoidance of hazardous MET conditions with greater accuracy allowing prediction at a time and place.

RESOURCES

ICAO GANP

- [ASBU Meteorological Elements](#)

ICAO

- [Plan for Aeronautical Meteorological \(MET\) Information in System-Wide Information Management \(SWIM\), April 2021, Version 2.3](#)
- [Guidelines for the Implementation of OPMET Data Exchange using IWXXM, Fourth Edition November 2020](#)

ICAO Uniting Aviation

- [Meteorology: Forecasting and warning to improve flight safety and efficiency, 2019](#)

SESAR Solution

- [Delivering tailored MET information with the 4DWxCube and MET-Gate](#)
- [Improved MET services](#)

Information Exchange Model (IWXXM) and the move towards the inclusion of MET information within the System-Wide Information Management (SWIM) concept supports the consistent and timely sharing of MET information amongst all stakeholders.

There are air traffic concepts currently in use, such as time-based separation at Heathrow Airport where the use of local MET information (wind conditions) is used in conjunction with aircraft performance data and analysed to optimise spacing on arrival, hence increasing capacity (also recovering capacity lost due to strong headwinds) and reducing fuel burn and emissions⁵.

In addition, some aircraft have technology available on-board where the most optimal flight trajectory is sent to the cockpit to enable the pilot to adjust their flight path to save fuel and fly more efficiently based on high resolution MET information sent at intervals of less than one minute. It has been estimated that at pre-COVID-19 traffic volumes, optimising flight trajectories based on MET information using this technology has the potential to save 1.24m tonnes of CO₂ per annum⁶.

⁵ <https://www.nats.aero/services-products/n/intelligent-approach/>

⁶ <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2021/weather-forecasts-could-save-aviation-industry-millions-of-tonnes-of-co2>

4.2.3 Improved Surveillance

Surveillance can be broadly defined as a system that detects aircraft and accurately calculates position information and other related information (e.g., flight level, speed). Surveillance data is then presented to air traffic controllers on displays and in some instances can be shown to other ATM stakeholders including pilots in the cockpit. Surveillance can be provided by satellite or ground-based infrastructure such as radar towers or ADS-B antennas.

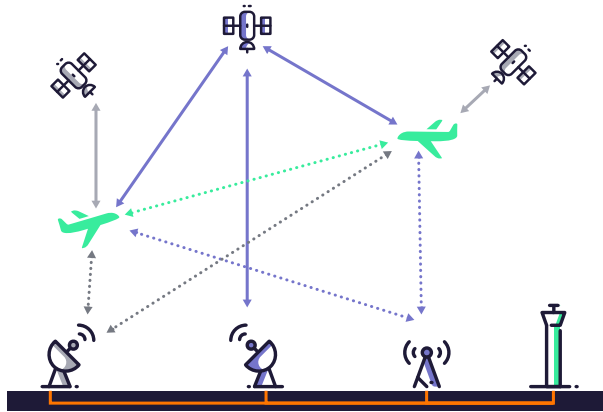


Figure 11. Surveillance

While there are surface surveillance systems that aid with management of ground movements at airports, this topic is intended to focus on airborne ATC surveillance.

Surveillance plays a critical role in air traffic control. The capacity to accurately determine aircraft location has a direct impact on the separation distances required between aircraft (separation standards), and in that regard also influences the capacity and efficiency of airspace utility⁷. Improving surveillance coverage and applying appropriate surveillance standards is key to safely increasing airspace capacity and optimising flight efficiency.

Improved ATC surveillance aims to bridge the gap between ATCO expectations of aircraft movements based on the last reported position, particularly where situational reports are verbal. Providing ATCOs with accurate surveillance data to be able to precisely identify when aircraft movements do not conform to expectations, provides a key safety improvement.

Adding surveillance to previously unsurveilled airspace can both contribute to improvements in overall airspace capacity, and enable improved management of aircraft trajectories, such as flight level changes over the ocean, or improved arrival procedures into airports in mountainous regions. Having assurance of actual aircraft positioning helps air traffic controllers avoid inefficient vectoring commands to maintain separation assurance and may contribute to the achievement of other GANP objectives such as improved access to optimum flight levels in oceanic and remote airspace.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The ANSP is aware of airspace that is limited in its efficiency (routing and capacity) due to the current surveillance and communication performance capability.

Level 2 Objective: Initialisation of analysis weighing potential technology solutions and potential airspace efficiency benefits.

Level 3 Objective: Initiatives to improve airspace efficiency through enhanced surveillance coverage have been started.

Level 4 Objective: Enhancements to surveillance have been implemented and the information integrated into the ATM system. New routes and/or reduced separation standards have been achieved in accordance with available surveillance and communications. Benefits realisation analysis is being undertaken.

Level 5 Objective: The ANSP has maximised airspace efficiency using appropriate surveillance technologies and by applying appropriate surveillance standards.

RESOURCES

ICAO

- [ASBU ASUR Thread](#)
- [ASBU OPFL Thread](#)
- [Guidance Material on Comparison of Surveillance Technologies \(GMST\)](#)

CANSO

- [ANSP Guidelines for Implementing ATS Surveillance Services Using Space-Based ADS-B](#)

While adding surveillance comes with costs, the long-term environmental and operational efficiency benefits and cost reductions gained from improved surveillance may be worth the cost to undertake such investments.

Note: If you can provide a justification, supported by evidence, that your current surveillance capability meets the Level 5 requirement below, i.e., further optimisation of flight trajectories is not viable through the upgrading of surveillance capability, then you will be awarded the full points for this topic, and you are not required to complete Levels 1 to 4.

⁷ Guidance Material on Comparison of Surveillance Technologies (GMST). ICAO. 2007

4.2.4 Airport Collaborative Decision Making

Airport Collaborative Decision-Making (A-CDM) is a set of processes developed from the general philosophy of collaborative decision-making (CDM) in aviation and is applied to the operations at airports to assist in resolving the problem of congestion. In recent years, it has become a key process supported by CANSO, the International Civil Aviation Organization (ICAO), Airports Council International (ACI), and the International Air Transport Association (IATA).

There are currently manuals on A-CDM and the associated standards, including Single European Sky ATM Research (SESAR), Next Generation Air Transportation System (NextGen) in the USA, and Collaborative Actions for Renovation of Air Traffic Systems (CARATS) in Japan, which incorporate variants of CDM. Each of these organisations and projects developed a vision according to their specific needs and context.

A-CDM can optimise airport operations by enhancing the turnaround process and improving flight predictability through real time data exchange for all A-CDM stakeholders. A-CDM also potentially helps to improve gate/aircraft stand management, and to reduce congestion at aprons, taxiways and holding points. A-CDM involves implementing a set of operational procedures supported by the sharing of timely and accurate information amongst A-CDM stakeholders. Overall, A-CDM is about making more efficient use of existing capacity and resources, as well as better managing recovery from disruptions. A-CDM can, in some cases, reduce operating cost attributed to fuel burn and contribute to environmental benefits.

Any implementation of A-CDM must be based on assessment of current operational constraints and the value an A-CDM implementation will generate to mitigate such constraints and/or improve current operations. There is a set of essential elements as well as best practices to consider when implementing A-CDM that will simplify and harmonise the implementation. However, each implementation must be based on careful engagement across all airport stakeholders, primarily the airport operator, aircraft operators, ground handling agents, air navigation service provider and air traffic flow management unit. There is no 'one-size-fits-all' A-CDM process or tool set that can be bought off-the-shelf and implemented ready-to-use. ANSPs, airports and airlines differ in terms of size, strategy, status, constraints, and business models, and each of these differences may require a different form or level of airside A-CDM.

Prior to A-CDM, the stakeholders worked on the basis of 'first come, first served' in the start-up sequence of aircraft. A-CDM, on the other hand, works on the basis of 'best planned, best served' in which aircraft operators/ ground handling units provide updated estimates of their target off-block times (TOBTs). ATC will then optimise the pre-departure sequence by issuing target start-up approval times (TSATs) based on the TOBTs submitted. It is a collaborative approach among all the A-CDM stakeholders and success is ultimately dependent on the accuracy of TOBTs managed by aircraft operators.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness within the organisation of the benefits of A-CDM, the organisation has explored the potential benefits of A-CDM implementation at those airports at which you provide ATS.

Level 2 Objective: To have a defined performance framework for A-CDM and to have established the pre-A-CDM implementation baseline(s). There is a common understanding across stakeholders as to how A-CDM will operate.

Level 3 Objective: Agreement has been reached on data that will be shared and the source (both manual and automated). As an ANSP you have demonstrated your commitment to A-CDM through the sharing of relevant ATC data within the A-CDM Information Sharing element and involvement in the A-CDM "Milestone Approach".

Level 4 Objective: Variable taxi-times and pre-departure sequencing are in operation at those airports at which A-CDM is beneficial. Post implementation KPI measurement and monitoring has commenced.

Level 5 Objective: A-CDM has been enhanced to interface with the local or regional ATFM systems and process. A-CDM performance is being monitored and reported regularly.

RESOURCES

ICAO	EUROCONTROL
<ul style="list-style-type: none">ASBU Threads A-CDM	<ul style="list-style-type: none">Airport collaborative decision-making Implementation Manual
CANSO	IATA
<ul style="list-style-type: none">Airport Collaborative Decision-Making – Optimisation through CollaborationGuide on ATFM/ACDM Integration, 2020	<ul style="list-style-type: none">Airport Collaborative Decision-Making (ACDM) IATA Recommendations

To aid the generation of accurate TOBTs and TSATs in the A-CDM process, timely and accurate information updates are very important. Key information needed are landing times, i.e., Estimated Landing Time, Estimated In-Block Time, Actual Landing Time, and Actual In-Block Time from the arriving flight that is linked to the departing flight. Timely update of this information is related to the A-CDM milestones.

A-CDM can help all aviation stakeholders gain numerous benefits. These benefits include:

- Enhanced operations through greater information sharing
- Better customer experience through improved predictability, reduced delays
- Reduced environmental impact and costs through decreased fuel burn resulting from improved capacity management

Note: It is not practical for the GreenATM program to assess A-CDM activities at every airport within an ANSPs service area. Hence criteria are defined here for the number of airports to be included within your response:

1. The five busiest airports with greater than 80,000 annual commercial air transport operations (as per ICAO Annex 6, 11th Edition, Part 1, Chapter 1, Page 1-2)

or

2. If there are not five airports with greater than 80,000 annual movements within your service area then please provide details for the two busiest airports for which ATS service is provided.

Note: Level 1 only requires a single response, Levels two through five require a response per airport.

4.2.5 Surface Management

Approximately 90% of aircraft emissions occur at altitudes greater than 3,000 feet above the ground, with the remaining 10% emitted during taxi, take-off, initial climb, and during the approach and landing⁸. Improving surface management relates to the improved flow of ground traffic and can affect both vehicle and aircraft movements.

It is recognised that the accountability of ANSPs varies in this area. Some ANSPs are responsible for the management of movements on runways, taxiways, and aprons, while others may only be responsible for movements on taxiways and runways with other providers managing apron movements.

As with operations in the air, comprehensive situational awareness can facilitate the provision of efficient service and for that reason surface surveillance systems can aid in facilitating efficient movements of aircraft and vehicular traffic and may be useful when traffic on the aerodrome cannot be adequately seen from the aerodrome control tower during periods of low visibility or darkness

The Surface Movement Guidance Control System (SMGCS) is a control system that is designed to support safe movement on the taxiway infrastructure using enhanced visual aids and rigorous control procedures. While A-SMGCS (Advanced Surface Movement Guidance & Control System) is a system providing routing, guidance, and surveillance for the control of aircraft and vehicles to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level while maintaining the required level of safety.

It is not practical for the GreenATM program to assess ground management activities at every airport within an ANSPs service area. Hence criteria are defined here for the number of airports to be included within your response:

1. The five busiest airports with greater than 80,000 annual commercial air transport operations (as per ICAO Annex 6, 11th Edition, Part 1, Chapter 1, Page 1-2)
- or
2. If there are not five airports with greater than 80,000 annual movements then please provide details for the two busiest airports for which ATS service is provided.

Note: Level 1 only requires a single response, Levels two through five require a response per airport.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: Given an awareness of the benefits of A-SMGCS the organisation has assessed the safety and efficiency benefits at those airports at which ground movement services are provided.

Level 2 Objective: The performance objectives, business case and delivery programme for A-SMGCS implementation, at Level 1 and 2, exists for those airports that will benefits. Procedural enhancements to increase the efficiency of surface management have been considered and implemented where beneficial. Initiatives to enhance surface management have been identified, business cases prepared, and implementation plans formulated.

Level 3 Objective: A-SMGCS Level 1/Surveillance has been implemented and briefing of controllers, airport operator, ground handlers and pilots completed where necessary.

Level 4 Objective: A-SMGCS Level 3/ Routing and 4/ Guidance have been implemented, integrated with other airfield and air traffic systems, and briefing of controllers, airport operator, ground handlers and pilots completed where necessary.

Level 5 Objective: There is ongoing monitoring of surface management efficiency to track improvements and monitor for deteriorations in performance. The environmental benefits of improved surface management have been calculated, shared with stakeholders, and reported publicly.

RESOURCES

ICAO	EUROCONTROL
<ul style="list-style-type: none">ASBU Thread SurfaceAdvanced Surface Movement Guidance and Control Systems Manual, Doc 9830, First Edition, 2004	<ul style="list-style-type: none">Specification for A-SMGCS Services
	SKYbrary
	<ul style="list-style-type: none">Advanced Surface Movement Guidance and Control System (A-SMGCS)

⁸ Federal Aviation Administration Office of Environment and Energy, Aviation & Emissions A Primer, 2005. https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/aeprimer.pdf

4.2.6 Continuous Climb Operations

and

4.2.7 Continuous Descent Operations

Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO) have been included in the same brief as they employ the same techniques in flight operations, whilst also posing the same benefits.

ICAO defines CCO as:

“An operation, enabled by airspace design, procedure design and ATC, in which a departing aircraft climbs without interruption, to the greatest possible extent, by employing optimum climb engine thrust, at climb speeds until reaching the cruise flight level.”

And CDO as:

“An operation, enabled by airspace design, procedure design and ATC facilitation, in which an arriving aircraft descends continuously, to the greatest possible extent, by employing minimum engine thrust, ideally in a low drag configuration, prior to the final approach fix/final approach point.”

The result is an improvement in vertical flight efficiency through the reduction in the need for intermediate level-offs, which are often required due to reasons such as other conflicting traffic and sector boundaries.

CCO and CDO enable aircraft to fly an optimum flight path that is flexible. This in turn leads to numerous benefits, which can include reduced fuel burn and associated emissions, and in some cases reduced noise.

While both CCO and CDO are implemented by the aircraft operators who carry out these operations, they are enabled by the airspace and instrument procedural design and facilitated by air traffic control. Improvements in CCO and CDO can be achieved through changes to tactical management or through the redesign of airspace or approach or departure procedures.

While both CCO and CDO deliver environmental benefits, several studies have shown that a high percentage of aircraft already follow close to a CCO path, while a minority operate on a path providing continuous descent from top of descent. For this reason, ANSPs have more opportunity to deliver environmental benefits by focussing on improvements to continuous descent rates. Hence GreenATM has allocated greater points to the CDO topic than the CCO topic.

The accreditation levels on these two topics seek to determine the following:

Level 1 Objective: There is awareness of the noise and fuel benefits of CCO/CDO, and the organisation has made commitments to growing the opportunities for CCO/CDO. The organisation has a definition of what classifies as a CCO/CDO.

Level 2 Objective: There is/has been ad-hoc monitoring of the success in facilitating CCO/CDO. Discussions between the ANSP and airspace users have occurred and a common definition of CCO/CDO exists. Ad hoc activities are occurring to promote increased CCO/CDO.

Level 3 Objective: Specific awareness or training initiatives with air traffic controllers and pilots have been undertaken with the aim of encouraging CCO/CDO wherever possible. An initiative to review/redesign departures/arrivals to increase opportunities for CCO/CDO has been initiated. You have identified how you will monitor CCO/CDO rates on a frequent basis.

Level 4 Objective: Departures/Arrivals have been redesigned to enable CCO/CDO where possible. CCO/CDO rates at major airports are tracked at regular intervals (at least quarterly) and airspace users informed of their performance. Coordination with neighbouring ANSPs may be occurring to enable CCO/CCO where required, Memorandums of Understanding or Letters of Agreement may be in place.

Level 5 Objective: CCO/CDO rate improvement goals have been set and public reporting ensures accountability for progress.

RESOURCES

<p>ICAO GANP</p> <ul style="list-style-type: none">• ASBU Thread APTA <p>ICAO</p> <ul style="list-style-type: none">• Continuous Climb Operations Manual, Doc 9993, First Edition 2013.• Continuous Descent Operations Manual, Doc 9931, First Edition 2010.	<p>ICAO MID Region</p> <ul style="list-style-type: none">• CCO/CDO Workshop June 2022 <p>ICAO Environmental Report 2019</p> <ul style="list-style-type: none">• The Benefits of CCO/CDO. European Task Force Findings
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4.2.8 Performance Based Navigation (PBN)

PBN can broadly be defined as the concept of redefining an aircraft's required navigation capability from sensor-based to performance-based.

ICAO Doc 9613 defines PBN as:

*"Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace."*⁹

Where:

*"Airborne performance requirements are expressed in navigation specifications in terms of accuracy, integrity, continuity, and functionality needed for the proposed operation in the context of a particular airspace concept. Within the airspace concept, the availability of GNSS Signal-In-Space (SIS) or that of some other applicable navigation infrastructure must be considered in order to enable the navigation application."*⁹

Via resolution A37-11 ICAO set ambitious global implementation goals for PBN. Member States are required to develop implementation plans setting out the adoption of PBN within their airspace. These plans are to include routes and instrument approach procedures. The published ICAO DOC 9613 Manual provides information and guidance to all member States on PBN implementation which is to be adopted.

The PBN concept primarily exists on the foundation of RNAV (Area Navigation) which is a concept whereby aircraft can fly on any flight path they wish if it is within coverage of station-referenced navigation aids or within limits of self-contained aids.

The concept consists of three elements:

- The Navigation Specification
- The Navigation Aid (NAVAID) Infrastructure
- The Navigation Application

The Navigation Specification stipulates the main navigation performance and functionality requirements of the RNAV system, and how these requirements are to be met, identifying how the operation of the equipment meets the operational needs identified in the Airspace concept. The Navigation Specification can be either an RNP (Required Navigation Performance) specification or an RNAV specification. The main difference between the two is that the RNP specification requires aircraft to have on-board performance monitoring and alerting as part of its functionality.

The Navaid Infrastructure relates to ground or space-based navigation aids (e.g., VOR, DME, GNSS) that are included within the Navigation Specification.

The Navigation Application describes the application

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is some awareness of the fuel efficiency benefit of PBN technologies and a commitment to undertake planning activities for implementation.

Level 2 Objective: A State plan is filed with ICAO setting policy and timelines for implementation. The plan is up to date. Some PBN implementation activities have commenced.

Level 3 Objective: Multiple PBN implementations are occurring/have been completed spanning airports and the enroute environment, in alignment with the PBN Implementation Plan. Engagement with airspace users has identified any equipage issues and helped drive priority setting.

Level 4 Objective: Tracking of implementation shows progress over time or achievement of a high level of PBN implementation. Activities are clearly focussed on benefits realisation (not just overlays) and fuel savings benefits are estimated/modelled before implementation and validated afterwards. There may be noise modelling undertaken where warranted or required.

Level 5 Objective: The airspace has been largely modernised with a high level of PBN implementation. Advanced concepts such as Established on Required Navigation Performance may be in use at busy airports. Widespread use of RNP enroute has improved capacity and increased point-to-point navigation. An active approach to measurement demonstrates clear benefits realisation. There may be evidence this is driving airspace user action with respect to equipage/training.

RESOURCES

ICAO GANP

- [ASBU Thread APTA](#)

ICAO

- [Performance Based Navigation \(PBN\) Manual \(DOC 9613\)](#)
- [Manual on The Use Of Performance-Based Navigation \(PBN\) In Airspace Design \(Doc 9992\)](#)

EUROCONTROL

- Courses – [Performance-based navigation \(PBN\)](#) (some free of charge)
- [European PBN implementation and transition planning handbook](#)

Boeing, Aeromagazine article

- [Operational Benefits of Performance Based Navigation, 2008.](#)

CANSO

- [Use of Performance Based Navigation \(PBN\) for Noise Management, 2020](#)

of the Navigation Specification and the Navaid Infrastructure to ATS routes and instrument flight procedures.

Since PBN represents a shift from sensor-based to performance-based navigation, it enables several benefits to be gained through switching from a sensor-

⁹ [Performance-based Navigation \(PBN\) Manual, Doc 9613, ICAO, 2008.](#)

specific method of developing airspace and obstacle clearance criteria. It provides the opportunity for operational benefits in the areas of:

- Safety
 - Improved accuracy of lateral and vertical track keeping
 - RNAV and RNP system use clarification
- Resiliency
 - Reduces the vulnerability associated with the use of conventional ATS routes dependant solely on ground-based nav aids in areas prone to catastrophic weather events such as the Caribbean.
- Operational efficiency
 - Limited set of navigation specification for global use
 - Avoids developing sensor specific operations with new evolution of navigation systems
- Airspace capacity
 - More efficient use of airspace and route placement, due to moving away from the reliance of ground-based navigational aids
- Cost-efficiency
 - Reduced infrastructure costs
 - Reduced need to maintain sensor specific routes and procedures
- Environmental impact
 - Increased fuel efficiency and a reduction in CO₂ emissions from reduced congestion, and more flexible and optimum routings
 - Operational flexibility in route design to avoid populated areas or environmental sensitive areas

4.2.9 Wake Turbulence Optimisation

Wake turbulence is generated by every aircraft during flight. It is a function of an aircraft producing lift, creating two counter-rotating vortices trailing behind the aircraft. Wake turbulence generated by an individual aircraft can negatively affect aircraft following due to the direction, duration, and strength of the vortices. The greatest hazard from wake turbulence is induced roll and yaw of the aircraft, which if severe, could lead to possible damage to the aircraft and its occupants. It is particularly dangerous during take-off and landing where there is little altitude for recovery.

Due to the possible effects of wake turbulence, wake turbulence separation minima are defined by categorising aircraft into groups of aircraft types according to their Maximum Certified Take-Off Mass (MCTOM). ICAO define four wake categories of aircraft types:

ICAO Wake Turbulence Categories

WAKE TURBULENCE CATEGORY	MCTOM (KG)
Super (J)	560 000 or >
Heavy (H)	136 000 or > (except those aircraft designated as J)
Medium (M)	< than 136 000 and more than 7000
Light (L)	7000 or <

Figure 12. ICAO Wake Turbulence Categories

Wake Turbulence separation minima refers to the spacing between aircraft, determined either by time or distance to be applied.

There are five key benefits from optimising wake separation:

- Enhanced safety
- Increased airport capacity
- Increased resilience
- Reduced fuel consumptions and emissions
- Improved predictability

Wake Turbulence Re-Categorisation (RECAT) is an optimisation of the ICAO wake-turbulence categories to enable the safe decrease in separation standards between certain aircraft. The goal of RECAT is to reduce wake separations while not increasing wake risk beyond that experienced by the most exposed aircraft pairs today. Studies determined that in addition to weight, there are many other factors that affect the strength of the wake turbulence generated (such as speed and wingspan), as well as the following aircraft’s reaction to that wake. RECAT re-assigned categories A to F, added a “Super” category and split the “Medium” and “Heavy” categories into “Upper” and “Lower” versions. This enabled new separation standards to be produced, with one benefit showing more than an 8% increase per hour of runway throughput at Paris – CDG¹⁰.

At busy airports increasing runway throughput delivers benefits in reduced delays, less holding and provides capacity for improved recovery from events.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness within the organisation of the impact that optimising wake separation can have on improving throughput and reducing airborne and ground delays. Initial identification of airports at which optimising wake separations may be beneficial.

Level 2 Objective: Training for ATCOs aimed at achieving existing arrival separation minima. Some exploration of the possible benefits of new ICAO standards (RECAT) where warranted.

Level 3 Objective: Improved throughput on departure, and arrival runways through optimised wake turbulence separation minima, and the implementation of revised aircraft wake turbulence categories and procedures (RECAT).

Level 4 Objective: There is evidence that efforts to improve wake turbulence optimisation are reducing delays and improving capacity.

Level 5 Objective: Runway throughput is maximised through dynamic wake turbulence separation based on the real-time identification of wake turbulence hazards. The application of dynamic time-based aircraft-to-aircraft wake separation minima and changes to the procedures the ANSP uses to apply the wake separation minima. Benefits are monitored, shared with stakeholders, and reported publicly.

RESOURCES

ICAO GANP ASBU

- [WAKE Thread](#)

ICAO

- [RECAT Webinar 2021](#) presentations
- [Air Traffic Services Planning Manual](#), Doc 9426 Part II, Section 5, Chapter 3. Wake Turbulence

SESAR

- [Wake Turbulence Separation Optimisation](#)

FAA ATPUBS

- [Wake Turbulence](#)

EUROCONTROL

- [RECAT-EU European Wake Turbulence Categorisation and Separation Minima on Approach and Departure, Edition 1.2, 2018](#)
- [Approach and Departure Optimised Wake Turbulence Re-Categorisation and Pair-Wise Separation minima, 2022](#)

¹⁰ <https://www.sesarju.eu/sesar-solutions/wake-turbulence-separation-optimisation>

4.2.10 Trajectory Optimisation

There are many aspects to consider in optimising the management of enroute airspace, such as airspace structure, flight plan, ATFM, airspace restrictions, speed, and altitude. The focus of the trajectory optimisation topic is predominately the design of the enroute airspace and how an ANSP works to enable airspace users to be able to fly as close to their planned or preferred route as possible within enroute airspace. Optimisation of flight paths within enroute might be achieved through enabling planned routes, implementing, Direct Routes (DCT), flex-track routes, or Free Route Airspace (FRA). FRA is typically acknowledged as the optimal airspace structure as it allows the airspace user the greatest freedom in optimising their trajectories taking into consideration winds and altitude, resulting in less fuel-burn for airspace users when evaluated over wide geographic areas and/or long time periods.

Free Route Airspace (FRA)

ICAO defines Free Route Airspace (FRA) as:

“FRA is a specified volume of airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) waypoints, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.”

FRA enables airspace users to fly a route that is as optimal as can be, without the constraints of a fixed route network. FRA is implemented to enable airspace users to have a choice of multiple possible routes enabling improved enroute trajectories, enhancing horizontal and vertical flight efficiency. The FRA concept enables increased flight predictability, which can lead to possible capacity increases for ATM, whilst also benefitting the user.

FRA implementation can be customised:

- Laterally and vertically
- During specific time periods
- With a set of entry/exit conditions
- With initial system upgrades

As an example, analysis by EUROCONTROL have identified significant savings once FRA is implemented on a European level¹¹:

- 1 billion fewer nautical miles flown
- 6 million tonnes less of fuel burned
- 20 million fewer CO₂ tonnes emitted
- €5 billion in fuel cost savings.

The above savings highlight how significant benefits are possible from improvements in enroute trajectories.

Flex Track Routes

Flex Track Routes are another method of improving enroute efficiency. They are a non-fixed ATS route which is determined usually daily to provide the most efficient operational flight conditions.

The key aspect of this concept is flexible routes, rather than fixed routes enabling airspace users to operate efficient routes, with routes being calculated on a day-to-day basis in consideration of weather and other constraints. This enables airspace users to increase their

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness within the organisation of how enhancements to the design and management of the enroute airspace can facilitate airspace users to optimise their flight trajectory; and goals to deliver the enhanced airspace are being or have been defined.

Level 2 Objective: There is a strategy for the future enhancement of enroute airspace design and ATC operational practices to facilitate airspace users to optimise their enroute trajectories.

Level 3 Objective: The initial stages of an enroute airspace optimisation strategy have been implemented and there is evidence that airspace users are able to improve their flight trajectories within parts of the airspace and/or at certain times of day and/or when traffic levels allow.

Level 4 Objective: There is widespread implementation of FRA within the domestic airspace on a 24-hour basis, the trajectory performance is being monitored and unexpected results investigated. Engagement has commenced on collaboration to extend FRA to be cross-border.

Level 5 Objective: Cross-border FRA (if beneficial and possible) has been implemented and is fully operational. Cross-border FRA performance monitoring and publication of performance are on-going. As an organisation you are supporting other ANSPs to plan and deliver enroute trajectory optimisation measures such as cross-border FRA.

RESOURCES

ICAO GANP

- [ASBU Thread FRT0](#)

EUROCONTROL

- [Free Route Airspace](#) portal

SKYbrary

- [Free Route Airspace](#)
- [North Atlantic Organised Track System](#)
- [North Pacific \(NOPAC\) Route System](#)

fuel economies, which in turn lessens the environmental impacts connected to flying these routes. User-preferred routings are evident within this concept, as it highlights proven routings that have worked and that can be analysed to understand the benefits, with any changes to the routing being monitored to identify any possible improvements or alternative routes that can be utilised within flying a specific city pairing.

In several instances the main factor identified when creating and adapting these routes is the positioning of jet stream winds and other meteorological conditions. Monitoring these factors enable significant savings in fuel, reduction in greenhouse gas emissions and overall flight time.

Flex Track routes are a way to improve enroute fuel efficiency on long-haul routes, resulting in reduced environmental impacts.

¹¹ <https://www.eurocontrol.int/concept/free-route-airspace>

4.2.11 Air Traffic Flow Management (ATFM)

ATFM is defined by ICAO as:

“A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that the traffic demand is compatible with the capacities declared by the appropriate ATS authority.”¹²

ATFM contributes to the cost effectiveness, environmental sustainability, safety, and efficiency of an ATM system. ATFM supports effective use of airport and airspace capacity to ensure an optimal traffic flow when demand is predicted to exceed the actual capacity available. This smoothing of traffic demand in line with available capacity enables reductions in airborne and ground holding at airports and sectors operating over their capacities and improves the system's ability to optimise flight trajectories.

There are also efficiency benefits when ANSPs without regular capacity problems participate in regional ATFM programmes, such as facilitating compliance with ATFM measures assigned by other ANSPs for flights departing from their areas, thereby supporting an optimisation of the regional air traffic network.

ATFM should accomplish the following strategic and tactical functions, as detailed within the ICAO ATFM Manual (Doc 9971):

- Data collection in relation to infrastructure, relevant airspace and airport capacities and flight data.
- Analysis of the data.
- Comparing available capacity with the expected air traffic demand, identifying critical loads.
- Increasing the capacity available where required via a coordinated approach between ATFM function/ATFM unit and ATS units.
- When capacity cannot be increased, the implementation of other measures to combat this must be coordinated throughout the ATFM system, advising the relevant aircraft and between ATFM function/ATFM unit and ATS units of this process.

Benefits from implementing ATFM are:

- Enhanced ATM system safety
- Increased efficiency and predictability
- Effective management of capacity and demand through data analysis and planning
- Increased awareness and coordinated operations among stakeholders
- Reduced fuel burn and greenhouse gas emissions
- Efficient overall operations for both airspace users and ANSP

Overall, the implementation of ATFM services is beneficial for multiple stakeholders.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is an awareness of the benefits of ATFM to manage traffic flow in a way that minimises airborne holding and optimises the use of available airport and airspace capacity. The organisation has initiated engagement with airspace users and other ANSPs to explore the interest and support for ATFM.

Level 2 Objective: Opportunities to benefit from the implementation of ATFM have been identified. An initial set of common/complementary ATFM performance targets for all stakeholders has been defined. A Concept of Operations (CONOPS) has been prepared.

Level 3 Objective: The detailed design for ATFM operations has been completed. There is a comprehensive understanding of all procedures and systems that will require updating or development across all stakeholders to achieve ATFM implementation. An ATFM implementation programme is available and agreed.

Level 4 Objective: ATFM has been implemented and there is an efficient and frequent system of post-operations analysis evaluating the operations against agreed performance indicators. Discussions have been initiated with other ANSPs to share information on the benefits of ATFM to broaden the geographical reach of the ATFM network.

Level 5 Objective: An evaluation of ATFM benefits possible in a regional environment has been completed and a specific time bound commitment to expand ATFM agreed by the majority of regional ANSPs.

RESOURCES

ICAO

- [PANS ATM](#) Doc 4444, Section 3.2
- [Manual on Collaborative Air Traffic Flow Management \(Doc9971\)](#)

CANSO

- [Implementing Air Traffic Flow Management and Collaborative Decision Making](#)
- [Long Range Air Traffic Flow Management Concept](#), White Paper

SKYbrary

- [Air Traffic Flow Management \(ATFM\)](#)

¹² <https://ops.group/blog/wp-content/uploads/2017/03/ICAO-Doc4444-Pans-Atm-16thEdition-2016-OPSGROUP.pdf>

4.2.12 Research and Development

Research and development enables improvements to all aspects of the business. It contributes to enhanced understanding, helps prove or disprove benefits and helps refine procedures.

Achieving the aviation industry's climate goals will require new aircraft types, new energy sources and new operational methods. Research and development is actively underway on many fronts on the means to decarbonise our industry and reduce its environmental impact.

This topic aims to recognise those ANSPs involved in research and development related to sustainability. That involvement can be related to trials of new ATM technologies or procedures aimed at improving efficiency and reducing fuel burn or noise, or collaboration related to the testing of new aircraft types. The work can be originated by the ANSP or done in collaboration with other parties, including academia or research institutions, airspace users, airports, or aircraft manufacturers, or in some instances, companies outside our industry.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is a general awareness of research that is ongoing and some effort to stay abreast of developments in the field.

Level 2 Objective: There is a structured process, either through involvement in international bodies or other means to stay informed of cutting-edge developments and the outcomes of trials. There is some evidence of the ANSP being an early adopter of new practices.

Level 3 Objective: The ANSP has a demonstrable record of staying on top of industry developments and taking the outcomes of new research and looking for opportunities to operationalise them.

Level 4 Objective: There is evidence of an active desire and demonstrable record of the ANSP being involved in research activities in several areas. (Provide evidence of current activities or activities within the past 10 years)

Level 5 Objective: The ANSP has evidence of having played a significant role in numerous research projects, including having originated its own research or having played a leading role in an international or multi-party effort. (Provide evidence of current activities or activities in the past 10 years)

4.3 Infrastructure and Utilities

In this category the GreenATM programme examines ANSP activities related to their own infrastructure and utilities. In doing so we examine an ANSPs own environmental footprint – what programmes may exist and what activities have been undertaken to limit the impact of facilities and operations.

The infrastructure and utilities category includes four separate topics, and 14 points are available in this category.

- 4.3.1 Energy Management34
- 4.3.2 Power Procurement and Production35
- 4.3.3 CNS Rationalisation36
- 4.3.4 CNS Flight Inspection.....37

4.3.1 Energy Management

ANSPs consume energy to power their operations. Airport control towers, area control centres, administrative buildings, training facilities, and CNS equipment all consume energy.

In this topic we will look at what activities an ANSP may be undertaking to save energy and enhance energy efficiency in a systemic and continuous way.

At the higher levels of this topic (Level 5), an Energy Management System (EnMS) may exist within organisations and be certified according to ISO 50001. Energy management includes systematic analysis of the organisation's energy consumption, planning of measures to optimise energy use and regular monitoring of their efficiency.

The ISO 50001 relates to the development of an energy management system that provides a framework of requirements for organisations to improve environmental management.

If effectively implemented, an EnMS can benefit organisations through:

- Helping to reduce energy costs
- Support strategic planning for longer-term energy savings
- Increased energy security
- Improve energy management/environmental processes

Note if an ANSP has a full ISO 50001 or comparable accreditation and therefore meets the Level 5 objective they do not need to complete the questionnaire for Levels 1-4 on this topic.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: Awareness of the need to operate an EnMS. The relative importance compared to other sources, in terms of CO₂ emissions of energy consumption is known.

Level 2 Objective: To have planned an organisational EnMS. The scope and policy for the EnMS have been agreed. The significant energy uses within the organisation are identified. Energy objectives, targets and performance indicators have been set.

Level 3 Objective: The EnMS action plan has been defined and communicated. EnMS documentation is written, there is an active communication plan, competency has been identified and assessed and any training needs addressed.

Level 4 Objective: The organisation identifies and controls its energy consumption. A monitoring, measurement and analysis plan has been implemented. Documentation is retained as evidence of the implementation of the audit program and the results of the audit and as evidence of the results of management reviews, including the identification of opportunities for improvement and implementing the actions necessary to achieve the expected results. Energy consumption and management performance is published publicly.

Level 5 Objective: The EnMS has been certified to ISO 150001 – Energy Management or an equivalent standard.

RESOURCES

ISO Standards

- [ISO 50001 — Energy management](#)

IEN

- [Energy Management Systems \(EnMS\)](#)

4.3.2 Power Procurement and Production

Power procurement and production relates to how your ANSP examines options for sustainable power procurement and whether there is any involvement in direct power production. Power includes electricity, heating, and fuel for ground-based vehicles.

Increasingly, in many locations there are options for purchase of more sustainable power and making such decisions can help to drive the electricity market. Having objectives and strategies within the organisation to explore and consider procurement options can reduce an ANSPs environmental impact.

To achieve the higher levels on this topic, evidence is required to show that energy is procured from sustainable sources.

In addition, several ANSPs are producing their own power either through solar installations at their facilities or wind turbines. That power may be used directly at their facilities or sold to the electricity grid to increase the overall percentage of renewable sources.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The organisation has made commitment(s) to minimise its carbon footprint from energy consumption (electricity, heating, ground based vehicle fleet). The organisation has identified whether existing electrical and heating energy sources are based on fossil fuels or renewable energy sources.

Level 2 Objective: All electricity and heating supply contracts have been reviewed covering all sites and actions have been identified to swap to renewable sources where possible. Plans for the measurement of electricity and heating energy consumption across all sites have been developed. Annual carbon or energy consumption figures for the organisation are tracked.

Level 3 Objective: An initial feasibility assessment of any renewable/lower carbon heating sources has been completed. At least 50% of electricity is from renewable sources. An assessment as to what company ground vehicles can be shared between users (a common pool of company vehicles available for use by staff rather than dedicated vehicles per job role or individual team) and/or transitioned to zero-emission vehicles has been completed.

Level 4 Objective: 100% of electricity is from renewable sources. Financial appraisals of options to reduce the use of heating energy or migrate to renewable or lower carbon heating fuels have been completed and decisions made on the way ahead. The company vehicle fleet is shared between users. The carbon footprint of annual energy consumption by sources is available.

Level 5 Objective: Any practical renewable or low carbon heating sources have been implemented and any heating reduction projects are complete. The company ground vehicle fleet is zero-emission (excluding specialist maintenance vehicles) and shared between users. The carbon footprint of annual energy consumption by sources is publicly available.

RESOURCES

ICAO

- [A Focus on the production of renewable energy at the Airport site](#)

Airport Technology

- [Sustainable energy: The airports harnessing green energy](#)

4.3.3 CNS Rationalisation

Communications, Navigation and Surveillance (CNS) infrastructure often represent a sizable footprint for the ANSP with equipment installations in numerous locations and often in remote sites. CNS enables safe, secure, predictable, sustainable, and efficient operations via the use of various systems, including satellite systems and varying levels of automation.

CNS rationalisation is the decommissioning of obsolete assets, and it is an on-going activity as CNS technology advances, e.g., the availability of space-based surveillance, and fixes, airways and flight procedures change.

The basic stages in identifying CNS assets for rationalisation are:

1. Identification of CNS assets
2. Determination of asset dependencies (e.g., which fixes, airways and procedures are dependent on which navaids)
3. Identify if dependencies, can be moved to an alternative source or site, and which may be obsolete and which are essential.
4. Move the dependencies that can be moved and retire those that are obsolete.
5. Identify which sites can now be decommissioned

CNS rationalisation programs can help to identify considerable savings in some instances by analysing the overall system and identifying equipment that can be retired to create a Minimum Operating Network (MON). Creating a timeline and implementation plan to enable the retirement of some assets will also enable the development an organised and efficient schedule required for the redesign of instrument procedures that were formerly dependant on that equipment. In some instances, these rationalisation efforts can be aided by cross-border collaboration and data sharing such as in the instance of surveillance systems that have cross border coverage.

CNS rationalisation can also deliver environmental benefits through reducing energy usage or enabling the rehabilitation and release of lands previously occupied by the equipment and reducing the need for maintenance visits.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness of the benefits from optimising the provision of CNS infrastructure, maintenance and operation and a commitment to investigate the opportunities and develop/update a CNS strategy has been made.

Level 2 Objective: The ability to rationalise CNS infrastructure through the sharing of CNS infrastructure, both in normal and fall-back operating modes, has been investigated with neighbouring ANSPs, the military and aeronautical data service providers. Any opportunities to rationalise/modernise CNS have been logged

Level 3 Objective: There is a CNS strategy that is less than three years old that identifies how the environmental impact of CNS infrastructure, maintenance and operation can be reduced. There is evidence of proactive management to optimise/rationalise CNS infrastructure and create MON. Agreements with other CNS providers (neighbouring ANSPs, military or aeronautical data service providers) are in place for the sharing of CNS infrastructure/data service. Plans for the shut-down and removal of the redundant infrastructure have been produced and approved.

Level 4 Objective: The energy consumption and use of liquid fossil fuels (standby generators) in the operation of CNS infrastructure is monitored. Opportunities to share CNS infrastructure/data services are active. You can provide evidence the removal of redundant or obsolete CNS infrastructure has commenced.

Level 5 Objective: One complete cycle of CNS rationalisation is complete and monitoring for future rationalisation is on-going. Targets have been set for reducing the energy consumption and use of liquid fossil fuels (standby generators) in the operation of CNS infrastructure. If any services/ infrastructure has been outsourced, you are able to demonstrate that these have increased the sustainability of your CNS operation.

RESOURCES

ICAO GANP ASBU

- [Navigation Minimal Operating Networks \(Nav. MON\)](#)

EUROCONTROL

- [CNS Infrastructure Evolution Opportunities](#)

4.3.4 CNS Flight Inspection

The inspection and calibration of CNS equipment requires validation flights to determine the resilience and performance of these systems. While ANSPs mostly influence aircraft emissions through their provision of ATS services, this is one area in which they may be directly operating aircraft that are burning fuel, or directly contracting those services from a third party.

These flights can and should be done in a sustainable manner, through techniques that can reduce the amount of flight time required per navigational aid through effective planning and coordination, the use of more fuel-efficient aircraft, and/or the use of Sustainable Aviation Fuels (SAF). Increasingly, ANSPs are using or studying the use of remotely piloted aerial vehicles for flight inspection, which operate without the use of liquid fossil fuels.

Flight inspection operations can have negative efficiency impacts on other traffic, particularly when scheduled during peak traffic times due to the unavailability of the runway during operations.

The aim should be for these inspection, calibration, and validation flights to be conducted in a manner that is as environmentally sustainable as possible.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: There is awareness that sustainability of flight inspection, calibration, and validation flights for CNS infrastructure such as ILS, VOR, PAPI, DME, GBAS, MLAT, can be improved. Work is underway to improve the efficiency of flight inspection operations.

Level 2 Objective: Efforts are underway to explore ways in which the impact of flight inspection operations can be reduced:

- Seeking process improvement in calibration techniques and protocols to reduce the time per navaid
- Investigating alternative approaches and/or equipment such as more fuel-efficient aircraft, zero emission aircraft/drones
- Evaluation of SAF blended fuel usage for flight inspections.

Level 3 Objective: The CO₂ emissions from flight inspection have been reduced by 10% over the average for the period 2015 to 2019. Flight calibration trials, utilising drones or low or zero emission aircraft are being undertaken.

Level 4 Objective: Flight inspection operations are undertaken with a combination of zero emission and traditional fossil fuel burning aircraft. Drones, low or zero emission aircraft have saved at least 10% of the baseline carbon emissions. The CO₂ emissions from flight inspection have been reduced by 50% over the baseline (average for the period 2015 to 2019).

Level 5 Objective: The emissions of flight inspection operations have been minimised. Where possible, zero emission technology is utilised. When not possible, 100% of inspections are operated with the maximum permitted SAF blended fuels. At this level, offsetting is only permitted for the proportion of the SAF blended fuel that is still kerosene.

RESOURCES

CANSO Blog

- [How drones can support air navigation service provision](#)

Advances in Science, Technology and Engineering Systems Journal Vol. 6, No. 3, 92-99 (2021)

- [Real Time and Post-Processing Flight Inspection by Drone: A Review](#)

4.4 Other Environmental

The final category deals with how an ANSP handles other environmental impacts, such as the impact of staff travel, impacts from the non-energy related items it procures, or community noise impacts from operations.

The other environmental category includes four separate topics, and nine points are available in this category.

- 4.4.1 Sustainable Procurement39
- 4.4.2 Airport and Community Relations40
- 4.4.3 Airspace Change Management.....41
- 4.4.4 Mobility Management42

4.4.1 Sustainable Procurement

Through the sustainable procurement topic, the GreenATM program evaluates how organisations recognise sustainability in their procurement of the goods and services that support the delivery of the ANSP’s business activities and whether procurement decisions consider the full life-cycle of the item.

In addition to acquisition, operation and maintenance costs, life-cycle costs within the meaning of ISO 20400 also mean indirect costs resulting from production, operation, and disposal in the environment. The ISO 20400 refers to the guidance provided by ISO to organisations on implementing sustainable procurement processes into their organisation.

Implementing sustainable procurement practices involves considering social, economic, and environmental factors along with the usual price and quality considerations into the organisation’s management of procurement processes and procedures. This topic links to the Environmental Management System (EMS) topic as sustainable procurement is a part of the EMS and at lower levels of this topic (level 1 and 2) awareness and integration of sustainable procurement is implemented by the organisation.

- The accreditation levels on this topic seek to determine the following:
- Level 1 Objective:** There is some awareness of the benefit of environmentally sustainable procurement with ad-hoc initiatives within the organisation, but no overall organisational commitment.
 - Level 2 Objective:** Environmentally sustainable procurement is a part of the organisation’s (environmental) management system. Sustainable procurement priorities for those sectors/ commodities with the greatest impact and opportunity for improvement have been set.
 - Level 3 Objective:** Environmentally sustainable procurement is implemented across the organisation, applying sustainability procurement criteria systematically to priority sectors/ commodities. The organisation is starting to consider a full life-cycle costing/circular economy approach when investing in or purchasing new equipment or facilities.
 - Level 4 Objective:** Monitoring and measurement of benefits is a part of organisations procurement model. Targets have been set for sustainable procurement.
 - Level 5 Objective:** The environmental impact is measured and assessed across the life cycle of all procured goods and services for those commodities identified at Level 2 as priorities. There is public reporting of environmentally sustainable procurement practices and achievements.

RESOURCES

- ISO Standards
- [ISO 20400 Sustainable Procurement](#)

4.4.2 Airport and Community Relations

This topic focuses on the organisation’s relationship with airports and communities regarding local environmental issues related to operations such as noise and/or air quality. At the highest level achievable for this topic, ANSPs undertake transparent and active engagement with communities and local airports on examining means to mitigate noise and environmental issues that have a wider impact on society/community.

Note: It is not practical for the GreenATM program to assess airport and community relations activities at every airport within an ANSPs service area. Hence criteria are defined here for the number of airports to be included within your response:

- 1. The five busiest airports with greater than 80,000 annual commercial air transport operations (as per ICAO Annex 6, 11th Edition, Part 1, Chapter 1, Page 1-2)
- or
- 2. If there are not five airports with greater than 80,000 annual movements then please provide details for the two busiest airports for which ATS service is provided.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The ANSP has a working relationship with the airport in relation to noise but has no direct involvement in community engagement.

Level 2 Objective: There has been ad-hoc communications with the community on noise issues as an ANSP, or in partnership with the local airport.

Level 3 Objective: There has been periodic attendance at the airport and/or community meetings. Presentations have been delivered to the community to explain the role of the ANSP and how they can mitigate noise.

Level 4 Objective: Nominated employees act as the external face of the ANSP at local airport/ community meetings. There is regular attendance by the ANSP representative at meetings with the airport and community.

Level 5 Objective: There are regular presentations and reporting of operational performance metrics related to noise mitigation (e.g., CDO, Use of night runways/flight paths) to airports and communities.

RESOURCES

ICAO Resolution A/39-1

- [Consolidated statement of continuing ICAO policies and practices related to environmental protection – General provisions, noise and local air quality](#)

ICAO Doc 9829

- [Guidance on the Balanced Approach to Aircraft Noise Management](#)

CANSO and ACI World

- [Managing the Impacts of Aviation Noise: A Guide for Airport Operators and Air Navigation Service Providers \(2015\)](#)

Aviation Noise Impact Management through novel Approaches (ANIMA), Noise management and community engagement

- [Scientific publications and deliverables](#)

4.4.3 Airspace Change Management

This topic looks at the airspace change management process and whether organisations consider impact to communities and the environment when considering options during the design process.

To successfully achieve higher levels for this topic, qualitative and quantitative assessments would be undertaken involving modelling of fuel and noise, whether required by local regulation or not. Stakeholder consultation and Post-Implementation Reviews (PIR) are also recognised as a best practice to understand whether actual noise and fuel impact is in line with estimates.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: Existing policies require, or a commitment to update policies to require, consideration of environmental and community impacts alongside safety and operational requirements when making airspace changes. The importance of ensuring consultation with all stakeholders as part of the process is also recognised.

Level 2 Objective: The airspace change procedure requires a qualitative assessment of airspace change options for noise and fuel burn. The ANSP can demonstrate how the assessment is considered in (or has influenced) airspace change decisions.

Level 3 Objective: The change process requires a quantitative evaluation of noise and fuel burn estimates for a base line design and the design options. The ANSP can demonstrate how the evaluation is considered in (or has influenced) the selection of the preferred design options.

Level 4 Objective: The change process requires public consultation on the preferred airspace design. The consultation should allow the consultee to submit feedback, suggestions, and reasons for objection. The consultation feedback is evaluated and if warranted, the airspace change design is updated.

Level 5 Objective: The final stage of the change process requires a Post Implementation Review (PIR) of the airspace change to be complete to understand if the actual noise and fuel burn impacts are aligned with the pre-implementation estimates. The findings of the PIR are then published and/or communicated to the impacted community.

RESOURCES

CANSO

- [Use of Performance Based Navigation \(PBN\) for Noise Management](#)

ICAO Environmental Report 2019, Chapter 2

- [Operational Opportunities to Reduce Aircraft Noise](#)

ICAO Doc 10031

- [Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes](#)

4.4.4 Mobility Management

Increasingly, companies are including staff travel, whether business travel or commuting in their overall corporate environmental footprint.

Mobility management includes the systematic analysis of mobility aspects, the setting of objectives, the planning of measures to optimise mobility aspects and the regular monitoring of their effectiveness. Measures may involve initiatives to encourage or incentivise use of public transit, or provide carpool or bike parking options to employees, or electric charging stations in company parking lots.

Limiting unnecessary business travel, considering more sustainable options or even offsetting staff travel through purchase of carbon credits are ways of reducing the environmental footprint of staff travel.

The accreditation levels on this topic seek to determine the following:

Level 1 Objective: The ANSP has conducted an analysis of their mobility footprint and determined if they need to update or develop a mobility management system. The relative importance in terms of CO₂ emissions of mobility compared to other aspects (e.g.: energy consumption) is known.

Level 2 Objective: A mobility management system has been developed, integrating best practices in commuting and business travels.

Level 3 Objective: The mobility management system is implemented, and staff are aware of what is required.

Level 4 Objective: The mobility management system is fully embedded and the Plan Do Check Act (PDCA) cycle (further explanation of the PDCA cycle available through the resources below) has already been completed at least once.

Level 5 Objective: The mobility management system is fully embedded and the PDCA cycle is carried out at least every three years. Continuous improvement of mobility aspects is demonstrated and assured.

RESOURCES

European Commission

- Green Best Practice Community, [Minimising the environmental impact of commuting and business travel](#)

JTB Business Travel

- [The growing emphasis on sustainability in business travel, 2022](#)

Plan Do Check Act (PDCA)

- <https://en.wikipedia.org/wiki/PDCA>

5. CONTACT US

If you wish to participate in GreenATM, would like further information, or have questions regarding the programme then please contact:

The GreenATM Secretariat:

GreenATM@think.aero

or contact

CANSO:

Info@CANSO.org

6. ANNEX 1

6.1 Questionnaire Response Examples

This section provides examples of questionnaire responses to aid ANSPs in understanding the type and format of answers that are expected. These questions were taken from the questionnaire that was used during the trial when GreenATM was being developed. The most up-to-date version of the questionnaire may not contain the exact questions provided in the examples but are indicative of the content.

6.1.1 Example 1 – Air Traffic Flow Management

QUESTION

Has your organisation set a stretch target for further improvements delivered by ATFM, if so

GUIDANCE

Please explain what is being done to encourage improved performance.

Potential justification:

- Explain the stretch target set, why it is felt to be realistic and achievable whilst pushing the organisation to improved ATFM performance.
- Target agreed and published.
- Benefits are made known.

RESPONSE

Yes, the long-term goal is to achieve efficient and harmonised cross-border ATFM data exchanges based on the ICAO System-Wide Information Management (SWIM) concept. While working towards the long-term goal, the near-term goal would be to exchange ATFM data using the existing EUROCONTROL Slot Allocation Message (SAM) and related messages.

At present, all the Level 3 Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC ATFM) Nodes have completed the implementation of ATFM data exchange capability over AFTN/AMHS, using SAM, Slot Request Message (SRM), and Slot Cancellation Message (SLC) messages.

The Technical Sub-Group of the AMNAC has been working on the technical specifications for the exchange of ATFM data over SWIM technical infrastructure, building on the experience gained and lessons learned from the SWIM in ASEAN Demonstration.

EVIDENCE

Working Paper 8 at the 11th Meeting of the APAC ATFM/SG on “Progress Updates from Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC)

6.1.2 Example 2 – Continuous climb operations

Note: this example was provided in response to the first question within the CCO topic but was then referenced from later questions as the content was sufficiently detailed to answer multiple questions.

QUESTION

Are the Board/Directors aware of the fuel, noise, and operational benefits of continuous climb departure operations?

GUIDANCE

Briefly explain what leads you to this view

Potential justification:

- Internal or external statements confirming that the ANSP understands the benefits of CCO and is supportive of them.

RESPONSE

Yes

Justification through current operation:

An airport XXX operated by the ANSP has 100% PBN SIDs and an RNAV-1 mandate for all arriving and departing aircraft. The airspace structure facilitates CCO operations. CCO techniques are applied by ATC whenever possible.

In daily high-density operation, arriving traffic is levelled off and vectored to the landing runways in the most efficient sequence. At the same time, departing traffic is released on SIDs on their preferred climb profile, with altitude restrictions cancelled whenever possible. This amounts to practical achievement of a very high rate of CCO operations.

Airport YYY operated by the ANSP has 100% PBN SIDs. CCO techniques can only partly be applied by ATC (only a part of the flights and/or to a limited altitude) due to airspace limitations. No further actions to enhance CCO operations are planned.

Airport ZZZ operated by the ANSP has 100% PBN SIDs. CCO techniques can only partly be applied by ATC (only a part of the flights and/or to a limited altitude) due to airspace limitations. No further actions to enhance CCO operations are planned.

Justification of future CCO aspiration:

There is a national airspace redesign program, and the government has asked aviation stakeholders to develop more efficient routes by assuming improved descent and climb profiles. The results will deliver benefits in terms of reduced fuel and CO₂ emissions. These improvements are part of a 2023-2035 national airspace roadmap. The ANSP is a core partner in the airspace redesign program.

EVIDENCE

- Local Single Sky Implementation report for Nation ABC
- Responsible flying to 2050, Aviation bill 2020 – 2050
- Design Preference Decision, airspace redesign

6.1.3 Example 3 – CNS Flight inspection

QUESTION

Is there an understanding of the potential reduction in CO₂ emissions through optimisation of flight inspection activities?

GUIDANCE

Please justify your answer and provide evidence that there is awareness.

RESPONSE

Yes – aware that fewer aircraft hours will lead to a reduction in CO₂ emissions.

Taken from ANSP public website: In addition to helping its customers reduce their emissions through more efficient flight paths, the ANSP is always looking for ways to optimise its own operations. One such example is a recent initiative to reduce the ANSP flight inspection aircraft track miles by changing the way inspections are conducted. Traditionally, inspections of very high frequency omnidirectional range (VOR) — a type of navigation aid — were completed using a 10 nautical mile orbit around the VOR. Technological studies were conducted to determine how small of an orbit could be flown while still obtaining accurate data. The outcome was that the flight inspection team was able to reduce their orbit radius to four nautical miles, resulting in a 60% reduction of track miles for these types of inspections. In fiscal 2021, this led to an estimated reduction of nearly 26,000kg of CO₂ emissions resulting from lower jet fuel consumption.

EVIDENCE

Link to website

6.1.4 Example 4 – Mobility management

QUESTION

Has the organisation developed a strategy and company protocols for the sustainable management of staff travel and staff commuting?

GUIDANCE

Please justify your answer by providing copies of the mobility strategy and protocols.

RESPONSE

Yes, the ANSP has several policies.

For business travel the ANSP compensates emissions of all flights with via an airspace users Corporate Biofuel Program. The ANSP has participated in the biofuel program since 2018/2019. Through this initiative we support the use of biofuels and the further growth of this initiative. The ANSP makes its contribution to the program by compensating 100% of the travel of employees on the airline. In 2020 the ANSP had an aviation fuel consumption of 9.83mT, the ANSP purchased 11.66mT of biofuel; therefore 131 % of the total fuel consumption of the ANSP is sustainable aviation fuel.

- The collective agreement of the ANSP provides compensation for commuting up to a maximum one-way distance of 30 km from home to the place of work.
- Tax-free compensation (instead of a part of the end-of-year bonus) is available for the purchase of a bicycle.
- The New Working Guideline of the ANSP supports working from home for two days a week (thus reducing traveling).
- The ANSPs car fleet is in the transition of becoming fully electric (when possible) and is minimised by not replacing all cars. In 2020 five cars were replaced by electric cars. The ANSPs fleet currently has 25% electric cars (2020).
- The ANSP also provides charging stations at the parking garage to facilitate the purchase/use of electric cars by staff.
- The ANSP purchased three electric bicycles that are available at the head office for travel to other company locations at within the airport since 2019.

EVIDENCE

- Report Corporate Biofuel Program 2020
- KM allowance, see Collective Agreement (CAO): 4.7.1.1
- Consent New Working Policy & Intranet page
- Car Fleet: see Year report 2020 page 41
- Electric Bicycles: see annual report 2019, page 43



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