The Environmental Management Framework for Airports and Airspace Operators

Executive Summary

Emissions and noise will continue to rise in line with flight demands unless more action is taken now. This whitepaper outlines how airport operators and ANSP's can rapidly, and cost effectively reduce their environmental footprint and facilitate and predict the impacts of revolutionary technological and procedural capabilities. As leaders in the field, AerLabs presents our Environmental Management Framework as the solution to address these challenges.

Introduction

We are living in the era of environmental awareness. Sustainability is no longer a choice but a strategic must have for all organisations. The aviation industry is no exception, the only challenge is how to make a difference today, because most solutions focus on reducing the impact in many years or decades to come. This whitepaper aims to provide a framework which can be rapidly, and cost effectively implemented today to understand and navigate the environmental management of airport and ANSP operations. We explore challenges, risks, and benefits, demonstrating the need for a robust environmental management framework.

The Urgency for Environmental Impact Management

As the volume of flight activity is increasing[1], the aviation industry will continue to grow their contribution to global warming if no action is taken. With climate change and noise pollution on people's minds, everyone's looking at how aviation is affecting the planet.

Consequently, governmental bodies are making rules about noise and emissions, requiring increased reporting and transparency[2]. Sometimes governments even decide on reducing the number of movements to limit environmental impacts[3]. Even with a decrease in activity, it remains challenging for airport operators and ANSP's to bring emissions in line with the Paris Agreement which requires achieving net-zero by 2050[4].

It's not just about following the rules; it's about doing what's right for the planet and for their reputation in the long run. Customers want companies to be more eco-friendly. So, for the aviation industry to stay in the game and keep customers happy, they've got to get serious about managing their environmental impact and providing transparency. Management of environmental impact isn't just about installing some noise sensors or focusing solely on emissions or retrospective reporting. It's about taking a comprehensive approach that considers all aspects of environmental impact, from noise to emissions and beyond, from strategic planning to operational decision making.

Challenges and Risks

In the face of environmental challenges, the aviation industry must address the risks associated with not actively managing environmental impacts. Failure to adopt sustainable practices can have far-reaching consequences:

1. **Brand Reputation**: High carbon emissions, noise, and failure to adopt sustainable alternatives will damage brand reputation. In today's socially conscious consumer environment, companies risk losing customers and market share if they are not perceived to be taking action. Embracing corporate responsibility by implementing sustainable practices not only enhances brand reputation but also aligns with consumer values, fostering loyalty and trust.

---

[1] https://www.eurocontrol.int/publication/eurocontrol-forecast-update-2023-2029
[2] https://www.consilium.europa.eu/en/press/press-releases/2022/12/07/ets-aviation-council-and-parliament-strike-provisional-deal-to-reduce-flight-emissions/
[3] https://www.rijksoverheid.nl/documenten/kamerstukken/2022/06/24/hoofdlijnenbrief-schiphol
[4] https://www.schiphol.nl/en/you-and-schiphol/news/accelerated-co2-reduction-necessary/

2. **Regulatory Consequences**: Governmental and Regulatory bodies worldwide are imposing stricter environmental regulations and reporting requirements on the aviation sector. Non-compliance can have significant consequences, including fines, sanctions, and restrictions on operations. Additionally, the regulatory landscape is evolving rapidly, with potential liability for environmental damages becoming a growing concern for aviation stakeholders.

3. **Financial Repercussions**: Increased operating costs due to carbon taxes, penalties for exceeding emission limits, and the need to invest in expensive environmental mitigation measures can erode profitability. A reduction in movements will have a significant impact on revenues whereas good environmental management could enable an increase in capacity. Furthermore, investors and financial institutions are increasingly factoring environmental performance into their investment decisions, potentially impacting access to capital and investment opportunities.

Many in the industry are betting on technologies such as Sustainable Aviation Fuels (SAF) and hydrogen to achieve their net zero by 2050 commitments. While transitioning to SAF and hydrogen holds promise for significant reductions in carbon emissions, it will take years or decades to achieve an economically viable scale and require huge capital investment. In the meantime, environmental impacts continue to rise. The risk is that these new technologies don't get there in time to achieve the targets. We need to flatten the curve and reduce the environmental impacts caused by aviation today.

AerLabs Environmental Management Framework

Introducing the AerLabs Environmental Management Framework. An approach that consists of 4 connected steps that each have their distinct role in managing environmental impacts.
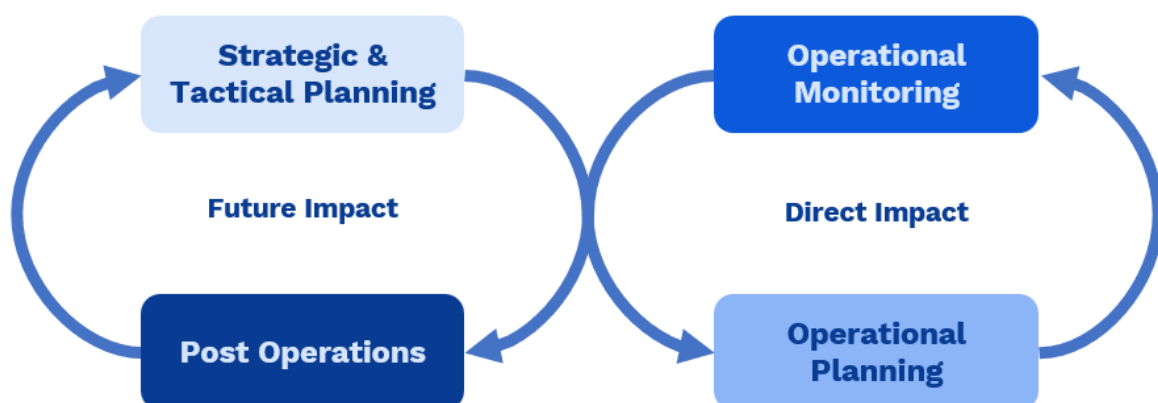

Figure 1: AerLabs Environmental Management Framework

1. **Strategic & Tactical Planning:** Medium to long-term planning of activities focused on shaping the future operations. Examples are runway layout, procedure design, and preferential runway systems. This step is crucial for laying the foundation for environmentally sustainable operations and engagement of stakeholders. Crucial for this step is the availability of good quality information of historic and predicted environmental impacts for various scenarios.

2. **Operational Planning:** Day-to-day decision making has a direct impact on environmental impacts around the airports and airspace. Examples of day-to-day decisions are runway allocation and SID/STAR allocation. Although this step is guided by operational preferences created in the previous phase, deviations are not uncommon and can have a big impact on local environmental impacts. Crucial for this step is the availability of clear environmental targets and expected impact of operational decisions.
3. **Operational Monitoring:** Quantifies environmental impacts of the operations by source. Examples are noise footprint tracking, fuel flow analysis, and tactical target tracking. Operational monitoring is crucial in environmental management because it allows for the quantification of environmental impacts stemming from specific sources, providing a base for sustainable operations. Crucial for good monitoring is the presence of data flows that can be analysed and enhanced in near real-time.
4. **Post Operations:** Involves analysis and evaluation of environmental performance after completion of operations. Examples are compliance reporting, community feedback, and target achievement. Post operations analysis and evaluation of environmental performance provides insights into the cumulative impact of daily activities, facilitating the identification of areas for improvement and the development of long-term sustainability strategies. Crucial for good post operations analysis is the availability of good quality data of operations and the availability of analytical models to gain insights from them.

The AerLabs Environmental Management Framework facilitates two cycles: the shorter Direct Impact cycle, and the broader Future Impact cycle. The shorter cycle focuses on day-to-day management and coordination and consists of the Operational Planning and Operational Monitoring. Closing this loop allows the operator to make conscious decisions to minimise the environmental impacts of their time and weather-dependent activities on a day-to-day basis.

The longer Future Impact cycle encompasses Strategic & Tactical Planning and Post Operations. This loop allows the operator to assess and take longer term decisions that will impact the future options available for the shorter cycle. It will optimise the airport operations and capacity with a full understanding of environmental and stakeholder impact.

The AerLabs Environmental Management Framework will reduce environmental impacts in two ways: by providing the right information directly to the operational decision makers, giving them the ability to always make the best possible decisions. Secondly, by looking holistically at airport and airspace to facilitate and predict the impacts of revolutionary technological and procedural capabilities. All while reducing the administrative overhead for compliance analysis and reporting and the need to pay for carbon offsets.

The Role of Technology in Environmental Management

Technology plays a huge part in environmental management of aviation. Both for reducing as well as measuring the environmental impacts. In a digital era, many systems are already in place to perform a small part of it. Similarly, some of the data is already there, so let's use it to get an integrated and holistic view. The AerLabs Environmental Management Framework is there to guide operators to leverage their existing resources and get more insights from them to reduce their environmental impact and track over time.

Technology can help to automate compliance reporting, freeing up capacity for proactive management. Furthermore, cloud-based systems allow for quick and easy distribution of information to many different stakeholders, with presentation of the information tailored to their specific needs.

Conclusion

In conclusion, the aviation industry is at a pivotal moment in its journey towards environmental sustainability. The urgency for implementing an effective environmental management framework cannot be overstated. With regulatory pressures, consumer demands, and the looming threat of climate change, airport operators and ANSP's must prioritize sustainable practices today.

The AerLabs Environmental Management Framework offers a comprehensive solution to address the challenges and risks associated with environmental management. By integrating tactical and strategic planning, operational management, along with post-operation evaluations, into a continuous cycle, this framework will reduce environmental impact while optimizing airport capacity and operations, enhancing predictability and transparency for all stakeholders.

Technology plays a crucial role in enabling this paradigm shift. Leveraging existing systems and sensors, and adopting innovative solutions to broaden the capability will enable informed decisions, track progress, and automate compliance reporting. This not only improves operational efficiency but enhances corporate reputation and brand value, ensuring both environmental stewardship and long-term business success.

About Us:

AerLabs is an award winning, privately owned, aviation technology company based in the Netherlands. Our vision is to reduce the environmental footprint of airports, Air Navigation Service Providers (ANSP), and aviation regulators across the world helping them move towards a net zero future. AerLabs provides software and services to enable the aviation industry to use data to dramatically reduce their noise and emissions impact for their stakeholders.

AerLabs pioneered aircraft and airport noise modelling by creating Echo, an aircraft noise model. Since then, AerLabs has created a range of software and services to enable its customers to plan changes to their procedures and engage their stakeholders in impact management, near real time monitoring of environmental footprint created by their operations, and automating compliance reporting.

Contact Information

Are you looking to further understand what we can do for you or want to engage in a further discussion? You can reach us by email at info@aerlabs.com.

For more information about AerLabs you can visit our website: https://www.aerlabs.com

Follow us on social media: LinkedIn - https://www.linkedin.com/company/aerlabs/