ALIGHT

SUSTAINABLE AVIATION

Sustainability report

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A. Executive summary

This report presents a comprehensive overview of how sustainability is addressed and operationalized within the ALIGHT project, an EU-funded initiative supporting the decarbonisation of airports through sustainable aviation fuels (SAF) and smart energy systems. It aims to clarify key sustainability concepts, regulatory frameworks, certification standards, and practical implementations across the project's workstreams and partner airports. Beginning with an introduction to ALIGHT and its primary workstreams, Workstream A (SAF) and Workstream B (Smart Energy Systems), the report outlines the goals and methodologies behind the project's sustainability ambitions. Environmental, economic, and social aspects of sustainability are framed within the context of the United Nations Sustainable Development Goals (SDGs) and further specified for aviation applications. The report also summarises EU regulations such as ReFuelEU, REDII/REDIII, and CORSIA, highlighting their implications for SAF procurement and sustainability certification.

A key insight from the report is the challenge of harmonising sustainability criteria across overlapping regulations and voluntary certification schemes. While SAF can meet REDII/REDIII sustainability criteria, inconsistent definitions and auditing processes pose barriers to widespread adoption. Similarly, the transformation of airports into green mobility hubs hinges on integrated energy planning, the use of renewable sources, and electrified transport infrastructure. Work Package 6 in the ALIGHT project plays a central role in documenting these insights and producing guidance on SAF procurement and certification. It also identifies current gaps in emissions monitoring that may limit the effectiveness of sustainability reporting and management.

The report further investigates how the participating airport partners, Copenhagen Airport (CPH), Aeroporti di Roma (ADR), Lithuanian Airports (LTOU), and Centralny Port Komunikacyjny (CPK) works on improving sustainability. Each airport showcases

distinct governance models and sustainability strategies, with a shared challenge across airports being the alignment of long-term sustainability goals with short-term project and regulatory timelines.

B. Target audience

This report is primarily intended for sustainability professionals within the aviation sector, particularly those working at airports. However, as it covers various aspects of sustainability, it also provides valuable insights for professionals across industries and institutions involved in sustainability efforts.

In addition to outlining sustainability as a general concept, the report offers practical insights into key areas such as the supply and use of sustainable aviation fuels (SAF) and energy management at airports. While airport sustainability professionals remain the primary audience, the findings may also benefit stakeholders in fuel supply and production, policy makers, government officials, and others engaged in sustainability and energy efficiency initiatives, especially those within the aviation sector.

1. How to read this paper

This report provides key insights and recommendations for improving sustainability in the aviation sector, with a focus on airports. It is part of the ALIGHT lighthouse project funded by the European Commission under the Horizon 2020 framework programme. The project is structured around a series of work packages (WPs), each dedicated to a specific aspect of the project. These work packages are developed through individual or collaborative efforts of the workstreams, which are introduced in the following section. The WP's serve as structured components of the project, designed to achieve specific tasks accompanied by specific deliverables that document the project's progress, key findings, and recommendations.

This report, Deliverable 6.4, is the result of Task 6.4 under WP6, and draws upon the contributions of all project partners to ensure that sustainability is embedded throughout the project's framework. It synthesises the key findings related to sustainability, providing insights that can be applied or adapted replicated by other stakeholders, such as airports outside the project, looking to improve their sustainability practices within the complex operational landscape of airports.

The report begins by clarifying how sustainability is defined within the context of the ALIGHT project, providing a common understanding of its meaning. It then explores the relevant aviation regulations that have shaped the project's sustainability efforts, followed by an overview of key sustainability frameworks and certifications that have influenced the approach taken throughout the project. The report highlights the main findings from the two central workstreams: one focused on Sustainable Aviation Fuels (SAF) and the other on smart energy use, offering valuable takeaways for airports and other stakeholders. Lastly, the report provides practical examples of sustainability initiatives implemented by airports involved in the ALIGHT project, showcasing real-world applications that could inspire similar efforts elsewhere. An overview of the structure of the report is illustrated in Figure 1.

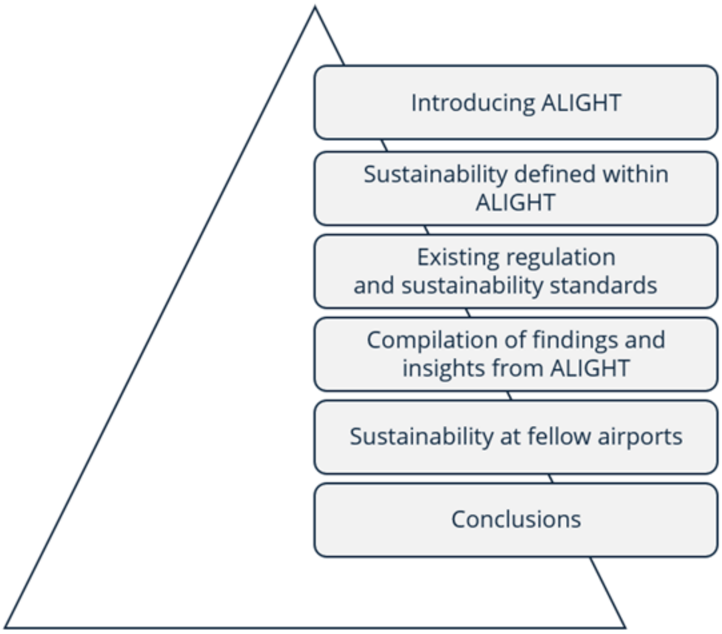

Figure 1: Structure of the report

1.1 Introducing Alight

The ALIGHT project is part of the EU Horizon 2020 program, designed to pioneer sustainable aviation solutions through partnerships. Its full name, *A Lighthouse for the Introduction of Sustainable Aviation Solutions for the Future*, reflects its role in guiding the aviation industry toward more sustainable practices. The project brings together 17 partners across 10 European countries, including airports, technology providers, and research institutions. In 2023, AIRBUS joined the consortium, contributing crucial perspectives from the aircraft manufacturing sector.

The project is divided into two main areas, described below.

1.1.1 Workstream A: Sustainable Aviation Fuels (SAF)

Workstream A focuses on Sustainable Aviation Fuels (SAF), a key element in the aviation industry's transition to sustainability. This workstream addresses several challenges:

Airport Infrastructure: Planning for future airport infrastructure to support the wide-spread adoption of SAF.

Procurement: Ensuring a reliable and sustainable supply of SAF, which can be produced from various feedstocks, each with different environmental impacts.

Sustainability: Addressing the challenges of maintaining the sustainability of SAF throughout its lifecycle.

This workstream aims to provide airports in the ALIGHT project understand these challenges and provide solutions, while also providing valuable insights for other airports seeking to adopt SAF in the future.

1.1.2 Workstream B: Smart Energy Systems

Workstream B focuses on Smart Energy systems, covering the entire energy management chain, from energy supply to storage and usage. Key activities include:

System Mapping: Mapping out the existing energy systems at airports.

Energy Management: Developing strategies for efficient energy use, incorporating renewable energy sources.

Energy Storage: Investigating how Battery Energy Storage Systems (BESS) can support airports in increasing their use of renewable energy.

As part of this focus, a BESS has been installed at Copenhagen Airports to gain hands-on experience with energy storage solutions. This will help understand how storage can balance the intermittent nature of renewable energy and contribute to the wider adoption of renewable energy solutions

1.1.3. Work Package 6: Sustainability

The objective of Work Package 6 (WP6) is to ensure that best practices in sustainability are embedded across WP2–WP5, supporting airports, airlines, and suppliers in advancing their environmental performance. WP6 also provides sustainability innovation input for replication toolboxes and strategic planning in WP8–WP9, ensuring the long-term impact of the ALIGHT project.

This deliverable specifically addresses Task 6.4: *Sustainability report and general advice*, summarising the advice carried out within WP6. The purpose of this task and report is to highlight key sustainability initiatives implemented throughout the project and offers recommendations for integrating sustainability across all aspects of airport operations. It serves as a guide for future airport projects seeking to enhance their environmental strategies, aligning with global aviation decarbonisation goals.

2. Sustainability in the context of ALIGHT

Sustainability is a central theme of the ALIGHT project, making it essential to establish a shared understanding of the concept and how it is specifically defined within the project. The most commonly referenced definition of sustainability originates from the United Nations Brundtland Commission's 1987 report, which defines it as; "*Meeting the needs of the present without compromising the ability of future generations to meet their own needs"*[1]. In line with this, the European Union defines sustainable development with emphasis on the planet's physical boundaries; "[...] *development that meets the needs of the present without compromising the ability of future generations to meet their own needs* ***within the planet's physical boundaries"***[2]. Within this broader discourse, sustainability is often understood as the intersection of three pillars: environmental, economic, and social. Each pillar holds valued importance; a solution cannot be considered sustainable if it neglects one of these aspects[3]. This holistic approach is illustrated in Figure 2 below.

Figure 2: The three pillars of sustainability

[1] UN, n.d. - Sustainability, United Nations. https://www.un.org/en/academic-impact/sustainability [accessed 23/1-23]
[2] European Commission, 2020, Horizon 2020 Online manual, Climate action and sustainable development https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/climate-sustainable-development_en.htm [accessed 23/1-23]
[3] Airport Council International (2021), Sustainability Strategy for Airports Worldwide.

In the context of ALIGHT, all three pillars are relevant, though they are emphasised on differently. While the primary focus of the project is on reducing the environmental impact of the aviation industry, economic and social considerations remain crucial to achieving long-term sustainability. Below, each of the three pillars will be explored further, and the Sustainable Development Goals (SDGs)[4] will also be discussed, as they provide an important framework for understanding sustainability in this context.

2.1 Environmental Sustainability

Environmental sustainability refers to the responsible use of exhaustible resources, as well as limiting harmful activities contributing to the degradation of Earth's ecosystems. Key factors such as climate change, energy consumption, and water use[5] are integral to ensuring that actions taken are genuinely sustainable. The aviation sector, in particular, has a significant environmental impact. For instance, pre-pandemic carbon dioxide equivalent (CO_2e) emissions from the aviation industry within EU reached 184 Mt in 2019, accounting approximately 4.2 percent of total emissions[6]. This impact stems primarily from greenhouse gas (GHG) emissions produced by aircrafts and the sector's high energy consumption.

ALIGHT addresses these environmental impacts by focusing on smart energy use, aiming to reduce GHG emissions from airport ground activities and lower overall energy consumption relating to scope 1 and 2 emissions of airports. This is closely linked the project's focus on the transitioning of airports to renewable energy sources, such as electrification of vehicles and equipment. These initiatives are detailed in Deliverables 4.1, 4.3, 5.1 and 5.2.

[4] United Nations, n.d.B, The 17 goals, https://sdgs.un.org/goals [accessed 13/4-2023]
[5] Airport Council International (2021), Sustainability Strategy for Airports Worldwide.
[6] European Union Aviation Safety Agency (2019), European Aviation Environmental Report 2019

Other significant environmental impacts from aviation include non-CO_2 impacts for example, contrails, ice-clouds formed by aircraft exhaust, which can have local warming or cooling effect. Additionally, emissions like nitrogen oxides (NOx), water vapor, soot, and aerosols also have an impact on climate and environment[7]. Local air quality is another aspect that must be carefully considered. These non-CO_2 impacts are addressed within WP3, as outlined in Deliverable 3.3.

Another crucial environmental consideration within ALIGHT and the aviation sector in general is the use of Sustainable Aviation Fuel (SAF). SAF has the potential to significantly reduce emissions compared to conventional fuels, but it also presents challenges, such as indirect land use changes (ILUC) and direct land use changes (DLUC). These factors must be carefully monitored to ensure that SAF production does not result in additional emissions or other negative environmental consequences, such as deforestation, biodiversity loss, or ecosystem degradation (see Deliverable 2.2). To address these concerns, ALIGHT focuses on the certification process of SAF provided by the Roundtable on Sustainable Biomaterials (RSB) and outlined in Deliverable 6.2. The project also emphasises blending SAF with conventional fuels to reduce emissions in line with current fuel standards, as described in Deliverable 6.1. Furthermore, research within ALIGHT explores how non-CO2 impacts of aviation can be mitigated through the use of SAF.

While the environmental pillar is the primary focus of ALIGHT, the project's success in achieving environmental sustainability is intrinsically linked to both the social and the economic viability of the project. Therefore, economic and social sustainability will be described below.

[7] DLR (n.d.), One-third CO2 and two-thirds non-CO2 effects, https://www.dlr.de/content/en/articles/dossier/electric-flight/climate-impact-air-transport.html [accessed 17/3-23]

2.2 Economic Sustainability

Economic sustainability involves supporting economic growth through the efficient use of resources, while minimizing negative impacts on the environment and society[8]. Achieving economic sustainability is essential for both SAF (or other alternative fuel types) and smart energy solutions for airports. For these innovations to be viable, it is crucial that they not only meet immediate needs of airports but can also scale to meet future demand.

The procurement of renewable energy must be feasible and affordable for airports, with the necessary infrastructure to support the use of alternative fuels like SAF. Ensuring that these solutions are economically viable will be key to their widespread adoption. Furthermore, enabling competitiveness between key stakeholders is vital for driving the transition of the aviation industry, as it can spur innovation and improve cost-effectiveness of sustainable technologies.

Within ALIGHT, these economic factors are considered to the extent possible. For example, a cost-benefit analysis of SAF has been conducted to better understand the economic implications of transitioning to alternative fuels, as outlined in Deliverable 6.5. This analysis helps ensure that economic sustainability is built into the project's approach, making it not only environmentally but also financially viable in the long term.

2.3 Social Sustainability

Social sustainability focuses on the well-being of society as a whole, taking into account the impact of sustainability efforts on local communities, employees, and customers[9].

[8] Airport Council International (2021), Sustainability Strategy for Airports Worldwide.
[9] Airport Council International (2021), Sustainability Strategy for Airports Worldwide.

In the context of ALIGHT, social sustainability is integrated into the project's workstreams, particularly within workstream A in the development and use of SAF. One of the key considerations is ensuring transparency throughout the SAF value chain. As demand for SAF (based on biomaterials) will most likely increase and thereby also the demand for certain feedstocks, it is essential to ensure that the production of these fuels does not lead to unsustainable practices, such as exploitation of resources or communities.

The RSB principles and Criteria relate to the support of a socially sustainable SAF production. These include consideration for local food security, human and labour rights (see Deliverable 2.2), and rural and social development[10]. These principles are applied as best practice in the use of SAF, not only by Copenhagen Airport (CPH) as the project's lighthouse but also by the project's fellow airports.

Within Workstream B similar aspects are kept in mind throughout value chains and the procurement process of different renewable energy solutions. These considerations work to encourage a just transition of the aviation industry. Furthermore, the project's focus on improving local air quality (primarily addressed in WP3) can potentially aid in reducing the impact on the surrounding environment.

Further, transparency has been an important aspect of the ALIGHT project. Ongoing communication ensures stakeholders remain informed, with reports from the project's deliverables made publicly available. This approach helps keep the process open and ensures that the sustainability efforts of the project are clearly communicated.

[10] Roundtable on Sustainable Biomaterials (2016), Principles and Criteria.

2.4 United Nations Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs), as mentioned, influence the understanding and definition of sustainability within ALIGHT. While the project does not directly work with the SDGs, four specific goals are identified particularly relevant and aligned with ALIGHT's objectives. These are presented in Figure 3 and include Goal 9; *Industry, innovation and infrastructure,* Goal 11; *Sustainable cities and communities,* Goal 13; *Climate action* and Goal 17; *Partnerships for the goals.*

Figure 3: United Nations, n.d.B

ALIGHT's focus on future airport operations and infrastructure aligns with Goals 9 and 11, supporting innovation while promoting the sustainability of both airports and surrounding communities. Climate action is the primary focus of ALIGHT, as the project seeks to reduce GHG emissions and mitigate non-CO_2 effects, directly contributing to Goal 13. Finally, ALIGHT is fundamentally a partnership between key stakeholders in the aviation industry, reflecting the importance of Goal 17.

Though the project does not explicitly focus on the SDGs, these four goals represent key outcomes that ALIGHT strives to achieve. Innovation and partnerships are essential to advancing sustainability within the aviation industry, making them central to the project's approach. Additionally, the transition to more sustainable airports is critical for the broader goal of creating more sustainable cities, and climate action remains a core element throughout the project. The aviation sector, including airports, has a significant environmental footprint, which is further explored in later sections of this report.

2.5 Sustainability as defined within ALIGHT

Sustainability in ALIGHT encompasses the combination of social, economic and environmental aspects, with emphasis on environment to account for the aviation industry's climate impact. Thus, contributing to a long-term and inspiring decarbonization of the aviation sector.

2.5.1 Sustainability specific for workstream A

In Workstream A, sustainability is primarily focused on the use of Sustainable Aviation Fuels (SAF). This includes careful consideration of both the environmental impacts and potential benefits of SAF, particularly in terms of emissions reduction. The goal is to ensure that the use of SAF contributes to a meaningful reduction in the aviation sector's carbon footprint, supporting the broader objectives of decarbonization and environmental sustainability. This implies ensuring that feedstocks are responsibly sourced avoiding competition with food production and ensuring carbon stock conservation among other requirements.

2.5.2 Sustainability specific for workstream B

Workstream B focuses on smart energy solutions for airports, aiming to support cost and energy efficient electrification . Sustainability within this workstream involves evaluating and implementing renewable energy alternatives, energy storage solutions, energy management and energy-saving technologies . By reducing energy usage and transitioning to alternative energy sources, Workstream B contributes to lowering the environmental impact of airport operations. Additionally, these efforts support the broader goal of creating a more sustainable aviation sector while also ensuring that energy solutions are economically viable and socially responsible.

3. Regulations relevant within ALIGHT

This section discusses key regulations that directly impact the work carried out within ALIGHT. Many regulations and directives relate to energy and SAF, why a few of high relevance are included here and expanded upon all within the context of the European Union, as this is the market in which the project operates. The regulations in varying degrees influence the project, specifically Fit for 55, as it poses specific demands on percentage of SAF used as well as energy efficiency going forward. Lastly some of the regulations have not yet been finalized or fully implemented and may not be, before the project ends. However, they offer essential guidance for the project's tasks and must be considered throughout the work in ALIGHT.

3.1 Fit for 55

The "Fit for 55" package is a set of regulatory framework package, including proposal updates for regulations aimed at achieving a 55% net GHG emissions reduction in 2030. This framework covers multiple sectors, focusing on renewable energy, upscale of sustainable solutions and GHG emission reductions, alongside updates to economic regulations like the EU Emissions Trading System (EU ETS). Its goal is to harmonise efforts across industries and support a fair and progressive shift towards sustainability.

3.1.1 ReFuelEU

One of the most significant elements of "Fit for 55" for the aviation sector is the ReFuelEU regulation. This mandates the uptake of SAF starting in 2025. In April 2023 the European Parliament and Council reached an agreement on the regulation, setting the blending mandates for SAF use that will affect airports and the rest of the aviation industry. The mandated SAF percentages are set to gradually increase over time. Starting in 2025, at least 2% of fuel used must be SAF, with this mandate increasing every five years. Table 1 summarises the mandated targets.

	2025	2030	2035	2040	2045	2050
SAF	2%	6%	20%	34%	42%	70%
Synthetic SAF	0%	1.2% (and 2% in 2032)	5%	?%	?%	35%

Table 1: ReFuelEU Aviation SAF mandates towards 2050

The mandates are divided into two categories: biofuels & advanced biofuels, and synthetic fuels (also known as E-fuels or renewable fuels of non-biological origins (RFNBO)). These categories are defined within the Renewable Energy Directive 2 (REDII), which is further elaborated below.

Another important aspect of ReFuelEU aviation is tankering, which means that an airplane must uplift 90% of the fuel from the departing destination based on the annually averaged consumption at a particular airport. This aids in avoiding over fuelling at a location, which would increase weight and fuel burn, thereby increasing GHG emissions. The full impact of ReFuelEU on ALIGHT, including specific regulations, is assessed in Deliverable 2.2.

3.1.2 Renewable Energy Directive (REDIII)

The Renewable Energy Directive (REDII)[11] is a key EU legal framework guiding the development and production of renewable energy and fuels, making it highly relevant for the scope of ALIGHT. Revised in October 2023 as part of the Fit-for-55 package it is now known as REDIII.

[11] RED II: EU directive 2018/2001 of the European Parliament and of the council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)
RED III: EU directive 2023/2413 of the European Parliament and of the council of 18 October 2023 amending EU directive 2018/2001, regulation 2018/1999 and directive 98/70/EC regards the promotion of energy from renewable sources and repealing council directive 2015/652.

The directive focuses on increasing energy production from renewable sources by establishing the necessary infrastructure, capacity, and accessibility. It also addresses renewable heating and cooling, alongside the development of alternative fuels, which aligns closely with the work in ALIGHT. REDII promotes reducing energy consumption and encourages the use of renewable energy, particularly in the electricity and transport sectors, aligning with WP4 and WP5 of ALIGHT. Additionally, REDII highlights the importance of expanding public transport, a theme explored in Task 5.2.

The directive also includes sustainability criteria for SAF, divided into three categories: biofuels, advanced biofuels and RFNBO. SAF supplied under the ReFuelEU regulation must meet the criteria set out in REDII, which will be detailed below. Annex IX of REDII which was updated in March 2024[12] specifies feedstocks for these fuels and sets caps on certain feedstocks to ensure sustainable scaling. The list of eligible feedstocks is regularly updated based on new sustainability findings. The impact of REDII on ALIGHT is further assessed in Deliverable 2.2.

3.1.2.1 Article 29 Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels

Article 29 includes various criteria of sustainability set for the use and production of biofuels stemming from agricultural biomass The criteria include safeguarding biodiversity in forest and grassland areas (Sections 3a-3b), preventing the use of raw materials from land with high carbon stock (e.g., wetland or continuous forested areas) (Section 4) and ensuring forest biomass meets specific harvesting criteria to minimise unsustainable production (Section 6). Additionally, biofuels from forest biomass must meet land-use and land-use change, and forestry (LULUCF) criteria (Section 7).

[12] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32024L1405

3.1.3 Energy Efficiency Directive (EED)

Introduced in 2012 (Directive 2012/27/EU)[13] to support the EU's 20 % energy efficiency target by 2020, the Energy Efficiency Directive (EED) was amended in 2018 (Directive 2018/2002) to aim for a 32.5 % improvement in energy efficiency by 2030. While neither directive imposes binding EU or national targets, they support broader GHG emission reductions goals, including the 55 % target by 2030.

Under "Fit for 55"[14] the EED is set to be recast, with Directive 2021/0203 under consideration. The agreed changes will include binding targets to reduce energy consumption at the EU level by 36% for final energy consumption and 39% for primary energy consumption by 2030. ALIGHT's work on smart energy and energy efficiency in WP4 and WP5 aligns well with these goals and can provide a useful model for implementing similar systems at other EU airports.

3.2 Carbon Offsetting and Reduction Scheme for Aviation (CORSIA)

The International Civil Aviation Organization (ICAO) has introduced the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which allows aviation operators to offset their carbon footprint with marked-based solutions or the purchases of fuels with reduced GHG emissions. Importantly, CORSIA is an offsetting scheme rather than a direct emission reduction program. This means that emissions will be allowed as long as it they can be offset, with a strong emphasis on promoting the use of SAF or lower carbon aviation fuels (LCAF).

[13] EUR-Lex - 32023L1791 - EN - EUR-Lex (europa.eu)
[14] Revising the Energy Efficiency Directive: Fit for 55 package (europa.eu)
"Fit for 55": Council agrees on higher targets for renewables and energy efficiency - Consilium (europa.eu)

CORSIA is being implemented in three phases. The pilot phase (2021-2023) engages ICAO member states with voluntary commitments. During this phase, a basic set of sustainability criteria was established for CORSIA-compliant fuels, with fuels demonstrating at least a 10% GHG reduction being eligible. As of 2023, 107 countries have voluntarily committed to the programme.

The second phase (2024-2026), while still voluntary, expands the list of sustainability criteria that fuels must meet to be eligible. Starting in 2027, the CORSIA program will become mandatory for all ICAO members. A more detailed description of CORSIA's framework and its impact on ALIGHT can be found in Deliverables 2.2 and 3.3.

3.3.1 CORSIA sustainability criteria

CORSIA has established a set of sustainability criteria for SAF that apply both before and after January 1st 2024. For future replication, this report focuses on the criteria after 2024. The criteria cover a range of environmental and social factors[15], including GHG emissions, carbon stock, water, soil and air quality, conservation, waste management, chemical use, human rights and labour rights, water use rights, local and social development, and lastly food security. In ALIGHT, all these criteria are relevant. However, since the RSB, an ALIGHT partner, is accredited to certify CORSIA applicants, a more detailed examination of the sustainability principles and criteria can be found in the RSB's guidelines. For the purpose of this report, GHG and other air emissions will be in focus, as these directly relate to several ALIGHT tasks.

GHG Criteria 1.1: CORSIA-compliant SAF must achieve net GHG reductions of at least 10 % compared to the baseline life cycle emissions of aviation fuel. This criterion aligns with ALIGHT's the overall goal of reducing emissions and minimising environmental impact, with SAF playing a key role in this effort.

[15] CORSIA Sustainability Criteria for CORSIA Eligible Fuels (icao.int)

Air Quality Criteria 5.1: CORSIA mandates that air pollution emissions from SAF must be limited. This is directly relevant to WP3, where ALIGHT explores the environmental benefits of SAF in Task 3.2. As part of this work, a measurement campaign was conducted at CPH in January 2023 to assess the improvements in air quality when higher SAF percentages are used.

3.3 Regulation concerning batteries and waste batteries

As part of Task 4.4, the implementation of a battery energy storage system (BESS) at CPH is supporting the smart energy management of airports. This initiative highlights the growing importance of sustainable energy solutions at airports, and it is crucial to consider the potential future replication of such systems. The European Commission, through the European Green Deal, has recently adopted regulations aimed at promoting more sustainable and circular batteries[16].

These regulations focus on ensuring the sustainability of batteries throughout their entire lifecycle, from sourcing to recycling and repurposing. Starting in 2024, sustainability requirements will be gradually introduced, covering areas such as carbon footprint, recycled content, and the performance and durability of the batteries. While these regulations will primarily target the manufacturers, airports will need to consider them when sourcing energy systems like BESS in the future. It is expected that the regulation will be adopted in 2024 and be fully operational by 2028.

[16] Regulation - 2023/1542 - EN - EUR-Lex

3.4 Sub-conclusion

This section has outlined the key regulations influencing ALIGHT and their ongoing impact on the aviation industry's transition, particularly in relation to airport operations. These regulations are central within ALIGHT as well as outcomes of the project, especially concerning the supply, uptake and infrastructure surrounding SAF. Later in this report the specific sustainability outcomes and findings of the workstreams will be further explored, and therefore and understanding of the regulatory landscape behind the work is needed.

4. Standards for sustainability

This section provides an overview of selected sustainability standards relevant to the aviation sector. While not exhaustive, the standards highlighted here are either actively used or referenced by the ALIGHT project partners. They serve various roles, from inspiring for target setting to guiding criteria for specific sustainability areas, or by offering accreditation pathways that support credible and science-aligned action within the sector. The purpose is to map key elements of the sustainability landscape shaping aviation, especially in the context of ongoing decarbonisation efforts.

4.1 Science Based Targets initiative

The Science Based Targets initiative (SBTi) is a collaboration between the Carbon Disclosure Project (CDP), the United Nations Global Compact (UNGC), World Resources Institute (WRI) and the World Wildlife fund for Nature (WWF). It provides a framework for companies to align their GHG emission reduction strategies with climate science. By defining and promoting best practices, SBTi supports the development of emissions reduction and net-zero targets that are consistent with the goals of the Paris Agreement[17].

For a target to be recognised as "science-based" it must align with what the latest climate science considers necessary to limit global warming to well below 2°C above pre-industrial levels, while pursuing efforts to limit it to 1,5°C. Companies commit through a letter of intent and must develop a target and associated detailed emissions reduction plan that meets the SBTi's criteria[18]. These targets are then submitted for official validation. In the context of ALIGHT, SBTi's Aviation Guidance is particularly relevant. This guidance supports companies in developing targets based on the Sectoral

[17] SBTi Progess Report 2021; Sciencebasedtargets.org n.d. [accessed 4/5-23]

[18] SBTi 2023, SBTi criteria and recommendations for near-term targets, version 5.1

Decarbonisation Approach (SDA), offering a structured method to model GHG emissions reductions over time. It includes a target-setting tool where companies input base year and projected activity data to develop a pathway toward their emission goal. As with all SBTi targets, those in aviation must be validated before public communication[19].

While the current SBTi aviation guidance does not include methods for addressing non-CO_2 effects, such as contrail formation and nitrogen oxides, these are recognised as important. ALIGHT can potentially contribute scientific insights in this area, complementing the existing framework and supporting more comprehensive climate mitigation in aviation.

4.2 Roundtable on Sustainable Biomaterials (RSB)

The Roundtable on Sustainable Biomaterials (RSB) plays a central role in certifying SAF, ensuring compliance with both international regulatory frameworks and high voluntary sustainability benchmarks. In particular, the *RSB ICAO CORSIA* Standard is aligned with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), ensuring that certified SAF contributes credibly to aviation's climate commitments. A further understanding of the certification process as guided by the RSB, can be found in deliverable 6.2.

The RSB Standard is underpinned by robust sustainability criteria that go beyond GHG emissions to include impacts on soil, biodiversity, air quality, and broader environmental and social factors. It promotes responsible feedstock sourcing, rigorous lifecycle GHG reduction requirements (often exceeding minimum regulatory thresholds), and adherence to human rights and fair labor practices.

[19] SBTi 2021, Science-Based target setting for the aviation sector, version 1.0

In addition to the CORSIA-aligned standard, RSB also offers the RED Standard, which complies with the European Union Renewable Energy Directive (EU RED III). This broadens the regulatory relevance of RSB-certified SAF, making it a key reference point for stakeholders involved in SAF production, supply chains, and airport operations.

Within ALIGHT, RSB's role is particularly important given the focus on implementation of more sustainable fuels. Providing expertise and accreditation that supports high-quality sustainability outcomes throughout the fuel supply chain.

4.3 Other voluntary schemes

To accelerate the transition to SAF, several voluntary initiatives have emerged to help companies reduce their scope 3 emissions. By purchasing SAF through these schemes, companies can claim the associated environmental attributes, with the support of third-party platforms such as Clean Skies for Tomorrow (CST), Fly Green Fund (FGF) or the Sustainable Aviation Buyers' Alliance (SABA).

Beyond the emissions reductions, these schemes play an essential role in bridging the cost gap between in paying conventional fossil fuels and SAF, which can be two to six times more expensive depending on the specific fuel type. By co-financing this price premium, these initiatives contribute to building early market demand for SAF and accelerating its scale-up.

While many of these schemes are still relatively early in stages of development, their relevance and activity are expected to grow as SAF products become more widely available and integrated into corporate sustainability strategies. More information on these initiatives and their relevance to SAF uptake can be found in Deliverable 2.2.

4.4 Sustainability Strategy for Airports by ACI

Airports Council International (ACI) is the global trade association representing airports. With over 500 airports in 55 countries, ACI provides leadership on key international policy issues and sustainability goals relevant to the airport sector through ACI World and through its regional organizations such as ACI Europe, relevant for activities in the European region and as such for ALIGHT.

ACI Europe committed in 2019 to achieving net zero carbon emissions for airport operations under its direct control by 2050, without relying on carbon offsetting. This commitment has driven the development of ACI's *Sustainability Strategy for Airports*[20], which serves as an industry-wide framework to guide airports in balancing environmental, social, and economic objectives.

As such, this strategy aims at providing a general direction and guidance to the sustainability efforts of European airport operators. It identifies recommended actions that can aid airports in becoming more sustainable and provides indicative metrics to help them measure their achievements and identify areas for further progress.

Though not a certification scheme or regulatory requirement, the strategy provides comprehensive guidance tailored to the priorities and realities of the airport sector. It helps airports assess their current maturity across different sustainability domains and set aspirations for future improvement. The framework includes recommended actions and indicative metrics to support performance tracking and decision-making.

The purpose of the Sustainability Strategy for Airports is articulated around a shared vision of the sustainable airport of the future, which is very much in line with the purpose of ALIGHT.

[20] https://www.aci-europe.org/industry-topics/industry-topics/28-airport-sustainability.html

4.4.1 Airport Carbon Accreditation (ACA) by ACI

Airport Carbon Accreditation (ACA)[21] is a global carbon management and certification program developed by Airports Council International (ACI). Administered independently by WSP[22], ACA provides accreditation services, guidance and support to airports participating in the programme.

ACA is the only institutionally endorsed, global carbon management certification programme for airports. It independently assesses and recognizes the efforts of airports to manage and reduce their carbon emissions through 7 levels of certification:

- Level 1: *Footprint measurement*
- Level 2: *Carbon management towards a reduced carbon footprint*
- Level 3: *Third party engagement in carbon footprint reduction*
- Level 3+: *Carbon neutrality for direct emissions by offsetting*
- Level 4: *Transforming airport operations and those of its business partners to achieve absolute emissions reductions*
- Level 4+: Compensation for residual emissions with reliable offsets
- Level 5: *The topmost level in ACA programme*

These levels reflect varying maturity of airports on their carbon management journey, accommodating all airport types, from major hubs and regional airports to general aviation and freight airports. The ACA framework is grounded in internationally recognised methodologies and provides a measurable structure for carbon management that is adaptable to national or local legal and regulatory conditions. The programme supports airports in achieving emissions reductions and enhancing energy efficiency.

[21] Learn more at: https://www.airportcarbonaccreditation.org/
[22] WSP is one of the world's leading engineering professional services firms. WSP are technical experts and strategic advisors and provide services to transform the built environment and restore the natural one, in areas including environmental and climate remediation, urban and transport planning, sustainable transport networks and strategies, airport sustainability, carbon management and energy planning and management.

ACA also acts as a benchmarking and maturity tool, helping airports assess progress and set future ambitions.

Within the ALIGHT project, ACA is highly relevant in several ways: as a tool for carbon accounting, as a structure for managing emissions, and as a means of tracking and demonstrating progress over time. The three fellow airports in ALIGHT are all actively engaged with ACA. CPH achieved Level 4+ accreditation in 2023, reflecting its commitment as the project's lighthouse airport. ADR was the first European airport to reach Level 4 + in 2021. Lastly, LTOU have aligned their net-zero strategy with ACA, with their airports currently accredited at Levels 2 and 3, with their 2050 goal aiming for Levels 3+ and 4+.

4.5 Sub-conclusion

This section has outlined key voluntary and institutional sustainability standards relevant to the aviation sector and airport operations more specifically. These frameworks, such as ACI's Sustainability Strategy, the ACA programme, and various SAF-related voluntary schemes, serve as valuable references for understanding the baseline and ambitions of sustainability initiatives across the ALIGHT partner airports.

A clear understanding of these existing standards is essential for interpreting ALIGHT's sustainability findings and assessing how the project aligns with or builds upon established frameworks.

5. Compilation of findings and insights from ALIGHT

This section provides a consolidated overview of the conclusions found from Workstreams A and B, with a particular focus on sustainability. It aims to serve as a practical guide for other stakeholders implementing similar projects by outlining how sustainability was addressed and to what extent it was achieved. Given that sustainability is a broad and context-dependent concept, this section consistently refers to ALIGHT's overarching definition of sustainability.

5.1 Workstream A and the sustainability of SAF

Workstream A centres on the use, implementation, and infrastructure related to Sustainable Aviation Fuels (SAF). At its core, it explores how sustainability is embedded into every step of SAF deployment: from feedstock sourcing and production to distribution and end-use. Questions like *how the fuels are produced, what do they consist of, where are feedstocks collected and what is the climate impact of the fuel in use*? are questions, which have been considered. This section compiles key insights and considerations that can inform other airports and stakeholders planning to engage with SAF.

5.1.1 How SAF meets EU sustainability criteria in REDII/III

This section outlines how Sustainable Aviation Fuel (SAF) and all elements of its supply chain—from production and storage to distribution and final delivery—comply with the sustainability criteria defined in the Renewable Energy Directive II (RED II) and RED III, as well as the requirements set forth by RefuelEU Aviation. A systematic approach is required, involving certification, documentation, and full traceability across the entire value chain.

The objective is to demonstrate compliance with environmental, social, and economic sustainability standards, ensuring that SAF contributes to climate goals without compromising biodiversity, land use, or social responsibility. This is achieved through adherence to specific key requirements, as described below.

Firstly, all SAF producers and suppliers must use EU-recognized certification systems such as the International Sustainability and Carbon Certification (ISCC)[23] or the Roundtable on Sustainable Biomaterials (RSB), as previously described. These third-party systems conduct rigorous, independent audits to verify compliance.

Secondly, SAF must meet the RED II/III sustainability criteria. These include significant lifecycle GHG reductions compared to fossil-based jet fuel: at least 60% for installations operating before 2021, 65% for those after 2021, and 70% for renewable fuels of non-biological origin (RFNBO). This is calculated using life cycle assessment (LCA), accounting for feedstock sourcing, production, energy inputs, transportation, and end use. Additionally, SAF feedstocks must not be sourced from areas with high biodiversity value, such as primary forests or protected ecosystems, nor from areas with high carbon stocks, including wetlands and forests. SAF production must also comply with soil and water protection standards and uphold social and economic principles, such as respecting human and labour rights throughout the supply chain.

To ensure traceability, a mass balance system must be implemented. Under this principle, sustainable and conventional feedstocks may be physically mixed, but the sustainability attributes are tracked and verified at every stage of the supply chain. Producers must maintain traceability through robust documentation and regular audits. Furthermore, comprehensive traceability and documentation are essential. SAF producers must maintain accurate records detailing the origin of biomass, processing, and

[23] In early 2025, concerns were raised regarding the International Sustainability and Carbon Certification (ISCC) scheme's oversight of waste-based biofuels, particularly in relation to alleged fraud involving imports from China. A temporary suspension of ISCC's EU recognition was proposed but ultimately not adopted. Since then, ISCC has worked closely with the European Commission to enhance its certification integrity. As of 5 May 2025, ISCC received a positive technical assessment under the revised Renewable Energy Directive (RED III), confirming its continued recognition as an EU-approved certification system.

distribution. The use of digital systems, such as blockchain or advanced supply chain management platforms, is encouraged to ensure end-to-end transparency.

Documentation and reporting are critical elements for compliance. SAF suppliers must provide valid certificates from EU-recognised certification schemes, also known as Proofs of Sustainability (POS), to confirm adherence to RED II/III. GHG emission calculations must be reported according to EU methodologies, and declarations must be submitted confirming that SAF quantities supplied meet all sustainability requirements. These documents must also fulfil national reporting requirements as RED II/III is implemented across Member States.

To ensure continued compliance, third-party audits are conducted regularly by certification bodies. In addition, national regulatory authorities may request further documentation and perform data checks as part of ongoing oversight.

Finally, all SAF supply chain data must be registered in the EU's Union Database. This digital platform supports traceability, transparency, and accurate sustainability calculations across the value chain. SAF producers and suppliers are required to enter supply chain information to ensure that all sustainability claims can be verified and reported in a harmonised manner across the EU.

Future outlook with the integration of sustainability

Looking ahead, a holistic approach is essential to ensure that SAF not only complies with the rigorous sustainability criteria set by the EU, such as those outlined in REDII and REDIII, but also contributes meaningfully to broader climate mitigation and social equity goals. Achieving this requires sustained investment in innovation, technology, and training to adapt to evolving regulatory landscapes and to continuously enhance sustainability performance across the SAF supply chain.

Equally important is the ability to learn and adapt through feedback. Audit findings and stakeholder insights should be systematically incorporated into processes to drive continuous improvement. As new data, technologies, and regulatory updates emerge, SAF systems must be flexible enough to integrate these developments effectively.

Guidance on sustainability must therefore be forward-looking. It should not only address current compliance needs but also provide a robust foundation for handling future challenges, such as, increasing mandates, competition for feedstocks and the development of new SAF products. Monitoring and responding to future policy changes, such as amendments to REDIII, as well as aligning with evolving industry best practices will be vital for maintaining both regulatory compliance and competitive advantage.

Deliverable 2.2 reviews several key issues critical for the sustainability of SAF. It begins by examining the challenges associated with GHG emissions and continues with deeper analysis of LCA methodologies, including their limitations. Subsequent sections explore the roles of non-CO_2 effects, direct and indirect land use change, and their importance of feedstocks selection. These elements will be central to ensuring the future scalability and environmental integrity of SAF in aviation.

5.1.2 The Lack of Harmonization between SAF Regulations and its impact of SAF adoption and sustainability certification

Work Package 3 (WP3), *Implementation and Usage of Sustainable Aviation Fuels (SAF),* addresses how to make the use of SAF more efficient and cost-effective by improving logistics and the uptake process at airports. It focuses on the downstream aspects of SAF supply and use, encompassing operational, logistical, environmental, economic, regulatory, and communication aspects. WP3 defines best practices and develops tools and methods for SAF supply and usage, while also aiming to strengthen technical capacity, improve guidance materials, establish robust accounting practices, and communicate the environmental benefits of SAF. A central component of this work is the development of a digital platform for fuel data collection and performance monitoring, enabling smarter decision-making on SAF deployment.

Specifically, the integration of SAF into airport fuel supply and logistics infrastructure is addressed, establishing best practices based on the Joint Inspection Group (JIG) Further, standards for fuel handling, safety, and quality control are identified. As well as SAF accounting and reporting requirements, developing proper concepts to seamlessly account for fuel quantities used, sustainability information, and GHG reductions. These efforts culminate in Deliverable 3.2, a comprehensive best practice handbook and tools for fuel logistics, quality monitoring, and accounting. It includes safety aspects, quality control, and identification and evaluation of SAF accounting and reporting requirements. This deliverable is crucial for ensuring that SAF is seamlessly integrated into airport operations, promoting the widespread adoption of SAF in the aviation industry.

Deliverable 3.2 also includes a section dedicated to describing the lack of harmonization between different sustainability certification frameworks for Sustainable Aviation Fuel (SAF) and the several challenges this presents for the aviation industry. With only just one month in its enforcement period, the implementation of ReFuelEU Aviation (RFEUA) regulation during January 2025 has served to highlight these challenges, particularly in terms of sustainability certification and compliance. This lack of harmonization affects both fuel suppliers and airlines, leading to inefficiencies and increased costs.

Challenges Arising from Lack of Harmonization

The absence of harmonized certification frameworks leads to several interrelated issues. First and foremost, inconsistent sustainability criteria across regulatory regimes—such as the EU Renewable Energy Directive (RED) and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)—create uncertainty and duplication. A

SAF batch certified under one regime may not qualify under another, forcing suppliers to undergo parallel certification processes. This adds administrative burden and increases costs.

Another challenge is an increase in compliance costs. Fuel suppliers face higher compliance costs due to the need to meet multiple sets of regulatory requirements. These costs are often passed on to airlines in the form of higher prices for SAF. The lack of a unified certification framework means that suppliers cannot take advantage of economies of scale, leading to inefficiencies and increased costs for the entire supply chain.

Moreover, limited market access arises because of lack of harmonization restricting market access for SAF. Airlines face challenges in sourcing SAF that complies with the regulatory requirements of all the regions they operate in. This limited market access hampers the growth and adoption of SAF, as airlines may be reluctant to invest in SAF that cannot be universally recognized and certified.

Lastly, the complexity of supply chains is exacerbated by the lack of harmonization in SAF regulations. Fuel suppliers must navigate different logistical and documentation requirements for each regulatory framework, leading to inefficiencies in the supply chain. This complexity can result in delays and increased costs for both suppliers and airlines.

Lessons Learned and Solutions

One of the critical lessons learned during ALIGHT is the need for a unified certification framework that aligns the sustainability criteria of different regulatory standards. Harmonisation would streamline the certification process, reduce compliance costs, and enable suppliers to scale their operations more efficiently.

Robust accounting mechanisms are also critical to support harmonisation. Accurate and transparent SAF accounting mechanisms are essential to support harmonization. A robust registry, like the proposed extension of the Union Database (UDB) for biofuels to include SAF, would facilitate accurate tracking and verification of SAF, ensuring that sustainability claims are substantiated across different frameworks.

To manage the current complexity, flexibility mechanisms are emerging as an important regulatory tool. The introduction of flexibility mechanisms in regulations, such as the one proposed in Article 15 of RFEUA, can help reduce compliance costs and logistical challenges. Allowing for cross-border compliance and leveraging existing supply chains can enhance the efficiency of SAF distribution and reduce the overall cost burden on suppliers and airlines.

Further, incentivizing global adoption of SAF through harmonized certification standards would aid in the transition. Non-European airlines, which currently do not benefit from EU ETS incentives, would be more likely to invest in SAF if it were recognized under multiple regulatory frameworks. This global approach would drive broader market uptake and support the aviation industry's sustainability goals.

One effective solution to the lack of harmonization is the implementation of dual conformance. Dual conformance allows a batch of SAF to be recognized and certified under two different sustainability compliance frameworks simultaneously, such as EU RED and CORSIA. With appropriate SAF accounting mechanisms and tools in place, SAF supplied as part of RFEUA could also be recognized as certified for CORSIA compliance. This would provide a clear incentive for visiting airlines to purchase SAF, thereby expanding market opportunities for fuel suppliers and promoting wider adoption of SAF across different regions.

In conclusion the lack of harmonization between SAF regulations poses significant challenges to sustainability certification and the broader adoption of SAF. However, by implementing lessons learned, particularly the need for unified certification, robust accounting, flexible compliance mechanisms, and dual conformance, the aviation industry can enhance its sustainability efforts, reduce compliance costs, and promote the widespread use of SAF. In doing so, the industry can accelerate its transition towards a higher degree of sustainability, while maintaining regulatory compliance and operational feasibility.

5.2 Workstream B and the sustainability of smart energy

Workstream B address the design, implementation and operation of smart infrastructure for renewable energy supply and use. Similar to the previous section on Workstream A this section focuses on understanding sustainability, but in relation to smart energy supply and use. The core objective of this workstream is to embed sustainability into airport energy systems, acknowledging both their direct impacts and the complexities involved in enabling such transitions.

While airports can actively shape aspects of their, transitioning to smart and renewable energy systems, it requires navigating technical, regulatory, and infrastructural challenges. At the same time, this rapidly evolving field offers opportunities for decarbonisation and efficiency improvements. The findings from the two key work packages in Workstream B provide practical insights and actionable outcomes that other stakeholders may draw upon when pursuing similar initiatives.

5.2.1 Transitioning airports into Green Mobility Hubs

As the process of transitioning airports into green mobility hubs often is a complex matter, it can be beneficial to divide the process into multiple phases (see Figure 5).

In the first phase, the focus must be on lowering the overall energy consumption. While energy efficiency measures are set in place, phase 2 can be initiated converting the residual energy demand to be met by renewable energy. This can be achieved through direct or indirect electrification, which will increase electricity usage at the airport but reduce demand for fossil-based energy in other areas, such as natural gas consumption.

Given the anticipated high level of electrification across airport operations, substantial volumes of renewable electricity will be essential to meaningfully reduce CO_2 emissions. As such, strategic and integrated energy planning is critical, introduced as phase 3. To make the most of cross-sectoral synergies and ensure system efficiency, the implementation of a smart energy management system is strongly recommended. This will require comprehensive live data collection and real-time system monitoring to support intelligent decision-making.

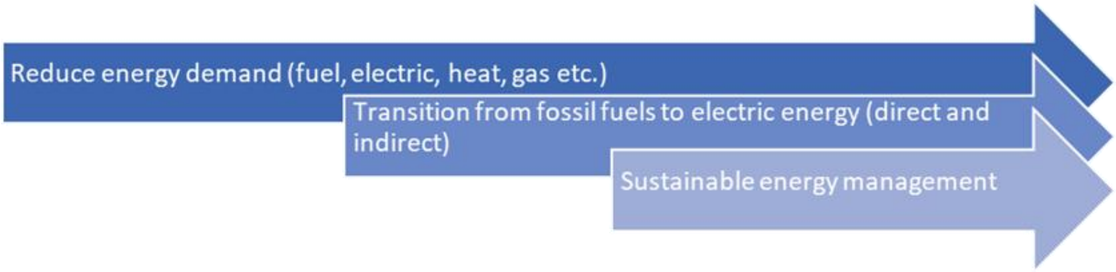

Figure 5: Structure for airports transitioning to green mobility hubs with three parallel progressing phases

Frameworks such as the ACA program offer valuable support by setting clear standards and incentives for carbon management. Additionally, targeted incentives for smart energy solutions can further encourage the adoption of innovative technologies and practices. Below the three above-mentioned phases will be further elaborated upon.

Phase 1: Reduce energy demand

Prioritising energy efficiency an essential *before* electrification is essential. Electrifying inefficient systems simply perpetuates the problem. Key areas for optimisation in an airport context will be assessed in Deliverable 5.1, 5.2 and 5.3. The key areas are, firstly, energy efficiency measures for buildings and secondly logistics and use of ground support equipment (GSEs).

Energy efficiency of buildings shall be prioritised as a precursor to electrification, emphasising that reducing consumption is generally more economically viable before integrating renewable energy sources (RES). This principle is illustrated with practical examples such as transitioning to LED lighting, upgrading HVAC systems, and enhancing building insulation. These measures not only reduce energy use but also lower operational costs and emissions.

In order to be able to reduce energy consumption, insight into the current operation using data is pivotal, as data can assist to identify areas of action.

Insights into current operations through data analysis is essential. Real-time historical energy data helps identify inefficiencies and target areas for improvement. Within ALIGHT, the participating airports have already implemented impactful measures. LTOU replaced all runway and exterior lights with LEDs, resulting in a yearly CO_2 reduction of 32 tonnes. Similarly, CPH replaced apron lighting with LEDs and integrated it into the building management system, saving energy and cutting approximately 42 tonnes of CO_2 annually. LTOU also constructed a new taxiway, reducing taxiing time by approximately two minutes per aircraft, thus lowering fuel consumption and emissions. More detailed information can be found in the deliverable 9.5.

Phase 2: Transition from fossil fuels to electric energy

When the energy demands have been reduced and made more efficient, the residual should be transitioned from fossil fuels to electricity from renewable sources. This is key to lowering scope 2 emissions (indirect emissions from energy supply). As heating, cooling, and transport systems electrify, total electricity demand will increase significantly.

As different systems in the airport (such as heating, cooling, and transportation) become electrified, electricity demand in airports rises significantly. Therefore, the usage of electricity must be monitored in order to plan the consumption and eventually made more efficient. A key strategy for smarter energy use involves controllable consuming units, like heat pumps, where the energy consumption can be adjusted based on the availability of renewable energy sources or to reduce the carbon footprint. Dynamic data can provide real-time insights into energy consumption and production and thereby enable opportunities for smart energy management. This data is crucial not only for immediate adjustments but also for long-term planning.

For instance, switching from fossil-based heat supply to heat pumps (combined thermal storage) significantly reduces emissions. Likewise, converting GSEs, buses, and other airport vehicles to electric or alternative fuels supports both decarbonisation and local air quality improvements.

Within ALIGHT work has been done to accelerate electrification of CPH, through the electrification of its GSEs fleet, where a specific planning tool has been developed to create a plan for the transition. This takes into account the type, age and role of equipment. Further, CPH has purchased electric busses for passenger transport to the terminals on landside to replace the existing conventional busses in 2025. Regarding the transition of two of CPH most used terminal busses to electric (operation will take place in 2025), it is expected to reduce 80.000 Litres of diesel annually, corresponding to approximately 215 tonnes CO_2. Within LTOU eight electric Ground Power Units (GPU) have been bought in 2024 to replace diesel driven GPUs. This project reduced consumption of diesel fuel in equipment and contributed to 209 t reduction in carbon dioxide emissions (7% of total CO2). Moreover, LTOU is currently in the process of acquiring electric buses. The aim of the project is to purchase buses with a lower environmental impact, as well as being passenger-friendly passenger for airport operations to ensure uninterrupted airport operations and passenger service. It is estimated that switching from diesel buses to electric ones will reduce CO_2 emissions by at least 58,000 kg per year. Moreover, LTOU are planning to buy electric busses and built the needed charging infrastructure. The transition of GSEs to electric GSEs is further elaborated on in D5.1. Also, at CPH, the taxi management system has been upgraded with a points-based system that prioritises electric taxis. This system allows electric taxis to park closer to the terminals and grants them preferential access within the airport area. The system is supported by a database containing information on registered taxis and drivers, automatic license-plate recognition, and demand forecasting. This is also elaborated on in Deliverable 5.1.

Further, when a large part of the energy consumption at the airport becomes dependent on electricity, access to renewable electricity is crucial. The airports should therefore investigate the possibility of having locally produced electricity e.g., through new energy projects. By prioritising local energy production, the airports take full responsibility for their own energy consumption and reduce the need for transport of electricity (transmission and distribution). At the same time their dependence on the public grid and supply is reduced, which increases the airports' security of supply and makes them more resilient to fluctuating energy prices. The airports should also ensure and prioritise the purchase of green electricity from the electricity grid e.g., through Power Purchase Agreements. By implementing and prioritising renewable energy production it will result in a reduction of CO_2 emissions for the airport.

CPH has installed local Photovoltaic (PV) plants covering approximately 4.5% of the total electricity consumption (own and tenants) and signed a PPA with two Danish wind farms for the remaining electricity consumption (Copenhagen Airports, 2024)

Moreover, energy storage systems enable the opportunity to fully utilise the renewable energy production, as it can be charged at times where renewable energy is in abundance and the price is low and can be discharged when renewable energy production is limited. Furthermore, energy storage systems have the potential to reduce peak demand and thereby reducing the need for electricity infrastructure, like transformers and cables.

To fully utilise the flexibility potential of controllable consumers and energy storage systems in combination with renewable generation it is necessary to implement a smart energy management system. The management system can strategically take into account, timed grid electricity uptake during periods of low CO_2 intensity.

As part of the ALIGHT project, a tool has been developed to structure and assess initiatives and incentive schemes aimed at encouraging passengers to choose more sustainable modes of transport to and from the airport.

Phase 3: Sustainable energy management

As the transition of energy consumption in airports must not only address current energy needs but also be flexible enough to accommodate future development. This calls for strategic, long-term energy planning. Key priorities include ensuring that the capacity of battery storage systems are scalable and that energy renovation of airport buildings is carried out to support greater efficiency and future integration of renewable technologies. Furthermore, the airport should prioritize planning of internal infrastructure to keep up with technological developments and thereby support new sustainable solutions such as electric and hydrogen-powered aircraft.

Effective energy planning can support decision-makers in their decision-making processes to choose solutions and technologies that meet both current and future requirements, even if they involve higher upfront costs, newer technologies, or additional training. For instance, Vehicle-to-Grid (V2G) systems may involve higher upfront costs for compatible chargers and vehicles compared to standard electric options.

Moreover, sustainable energy planning helps ensure alignment with broader climate goals by targeting reductions across all emissions scopes. Scope 1 and 2 emissions can be reduced by transitioning the energy supply for the airport's direct and indirect energy consumption as described previously, while Scope 3 emissions, those associated with tenants, airlines, passengers, passenger transportation to and from the airport, and other downstream activities, require broader coordination and collaboration. Within the ALIGHT consortium, emissions from passenger transport are calculated based on ongoing passenger surveys conducted throughout the year. Further details are available in Deliverable 5.1 and 6.3.

5.3 Work package 6 on sustainability

This section summarises the key sustainability insight gained through the ALIGHT project, highlighting the importance of a shared understanding of sustainability among all partners. The focus here is on the learnings derived from the dedicated sustainability Work Package 6 (WP6), with a particular emphasis on SAF, the airport's role in SAF procurement and communication, the SAF certification process, and the monitoring of CO_2 emissions from airport operations. These elements collectively contribute to strengthening the sustainability performance of airports and will be elaborated below.

5.3.1 Guidance on procurement of SAF for EU airports

As mentioned previously, SAF is acritical component in reducing GHG emissions in the aviation sector, which is projected to experience continued emissions growth. Airports are increasingly central to the SAF value chain, not only by facilitating SAF distribution but also by driving policy advocacy, integrating SAF into their sustainability initiatives, and informing passengers about its benefits.

Despite this potential, widespread adoption of SAF is still hindered by high costs, limited supply, and unclear definitions of the airport's role in the value chain. The *SAF Sustainability Guidance for Airports*[24] addresses these barriers by offering practical recommendations on how airports can support decarbonisation goals, and communicate SAF benefits effectively. It also explores the broader environmental, social, and economic value of SAF beyond emission reduction.

The main key sustainability findings from the SAF Sustainability Guidance for Airports can be summarised here:

Airports' Role in SAF Adoption

- Airports are becoming key enablers of SAF by supporting research, facilitating access to financial incentives, and advocating for policies that accelerate adoption.
- Challenges include high costs, limited availability, and infrastructure constraints, but airports can bridge these gaps through partnerships and demand aggregation.

SAF's Contribution to Decarbonization Goals

- SAF can reduce lifecycle greenhouse gas (GHG) emissions by up to 80%, making it a critical tool for lowering airports' Scope 3 emissions.
- Collaborations with airlines and policymakers can help airports integrate SAF into their sustainability frameworks and carbon reduction targets.

[24] SAP-2022-SAF-Guidance-for-Airports.pdf

Passenger Awareness and Communication

- While passenger awareness of SAF and understanding is low, there is a strong interest in learning more about sustainable aviation solutions. Airports have a unique opportunity to educate passengers through targeted campaigns, highlighting SAF's benefits for emissions reduction and air quality.

Beyond GHG Reductions: Broader Sustainability Considerations

- SAF sustainability should go beyond carbon reductions and include social, environmental, and economic impacts.
- As an example, RSB's 12 Sustainability Principles cover aspects such as human rights, land use, biodiversity, and water conservation.
- Certification programs ensure compliance with sustainability standards and mitigate risks associated with feedstock sourcing and production.

These findings highlight the growing role of airports in promoting SAF adoption, the sustainability challenges and opportunities within the SAF value chain, and best practices to accelerate the transition toward low-carbon aviation.

5.3.2 SAF for airport sustainability

The report "D6.2 Final Report of SAF for Airport Sustainability" presents Sustainable Aviation Fuel (SAF) as a pivotal tool for reducing greenhouse gas emissions in aviation, amid projections of significant emissions growth. While SAF adoption is growing, airports currently do not play a direct role in the SAF supply chain, posing a challenge to their participation in decarbonization. To address this, the report introduces a persona-based framework that analyzes the contributions of airports through five key stakeholder lenses: SAF suppliers, airlines, corporate travel, private aircraft, and freight operators. A major finding is the direct link between SAF and airports through Scope 3 emissions, which stem from aircraft fuel use. This connection creates new opportunities for airports to contribute to climate goals. In particular, the report explores the Book & Claim (B&C) system as a promising pathway for airports to claim Scope 3 emissions reductions, aligning with standards such as SBTi, GHGP, CSRD, and ACA. This suggests a future role for airports as active participants in SAF-related emission accounting and sustainability strategies, even without physically handling SAF. Despite these prospects, challenges remain, including high SAF costs, limited availability, and regulatory complexity. The report concludes with recommendations and roadmaps to support SAF integration in airport sustainability planning.

5.3.3 Gaps within the monitoring of emissions

Monitoring emissions from an operating airport is inherently complex due to the wide range of emissions sources, varying data availability, and accurate monitoring. Furthermore, stakeholder engagement is a crucial part of monitoring, as airport operations are not necessarily centralized but involves many partners working for the airport itself. Communication and coordinated data collection is essential for a robust monitoring system. This section therefore focuses on targeted areas where monitoring can be significantly improved, specifically emissions from transportation to and from the airport, and from the use of Auxiliary Power Units (APU) at aircraft stands.

Transportation to and from the airport

Emissions from passenger and staff transport are commonly estimated using surveys and available data sources such as parking capacity and public transport usage. As continuous, real-time data is rarely available, estimation remains the primary tool for assessing emissions. Through the ALIGHT project, efforts have been made to refine these estimations by establishing a best practice approach. This includes a methodology used by CPH, and the development of a user-friendly tool that other airports can use to estimate their own transport-related emissions. The tool requires only minimal input, though the accuracy of results improves with access to more detailed data. Further information is available in Deliverable 6.3 and 8.7.

Monitoring Auxiliary Power Units (APU) emissions

Another identified gap concerns emissions from the use of APUs, which provide power to aircraft while parked at stands. Traditionally, these emissions have been estimated based on assumed usage times. However, this approach is prone to inaccuracies, as actual APU usage varies depending on aircraft type, turnaround time, and operational procedures. To improve monitoring accuracy, an additional task and deliverable were added to the Alight project. CPH has implemented a pilot initiative involving the installation of thermal cameras at the 40 busiest aircraft stands to monitor real-time APU usage. This enables more precise measurement of APU-related emissions and provides valuable insights for future mitigation efforts. More details are presented in Deliverable 6.6. It is important to note that for airline emissions monitoring and reporting, APU emissions are addressed by CORSIA and the EU ETS. The accuracy of reported emissions depends on the monitoring methodology chosen by the airline.

6. Application of sustainability work within ALIGHT airports

A core component of the Alight project's sustainability work has been the exchange of knowledge and experiences among partner airports. This collaboration not only benefits the participating airports but also serves as a valuable resource for other airports beyond the project. A crucial element of successful sustainability work lies in the organizational setup. This includes how responsibilities are distributed across departments, how accountability is ensured, and how targets are defined and monitored.

To facilitate this exchange, a dedicated workshop was held, where partner airports shared insights into their sustainability strategies and organizational structures. This section provides an overview of the sustainability departments and approaches across the four Alight airports, beginning with Copenhagen Airports.

6.1 Sustainability at Copenhagen Airports (CPH)

CPH has developed its sustainability strategy over many years, with initial efforts focused on minimising local environmental impacts, particularly local air quality and noise pollution. Over time, these efforts have evolved into a comprehensive sustainability strategy comprising five key programs; Decarbonization, Circularity, Pollution, Climate Adaptation and Nature. Each program addresses a distinct area of sustainability, with varying levels of maturity and development, but all share an ambitious, long-term vision.

The program for Decarbonization encompasses all the activities within CPH's scope 1-3 and efforts required to mitigate the emissions to reach the goal of a Net zero airport (scope 1-2) in 2030 and development of comprehensive carbon management strategies within scope 3. The decarbonisation strategy includes energy efficiency, renewable energy transition, and collaboration across stakeholders.

The circularity program for aims to transform CPH into a fully circular airport by 2050. It promotes the principles of "using less, better and longer" and focuses on areas such as the airport's shopping center, construction, procurement, and overall waste management. The program encourages reuse, recycling, and sustainable materials.

The Pollution program addresses all forms of pollution generated by airport operations. It includes strategies to reduce local air pollution, noise nuisance, as well as water and soil pollution. Within all areas it is the ambition of CPH to reduce the impact on the local environment as best possible.

The program for Climate Adaptation is a new addition to the sustainability strategy, even though CPH has actively worked strategically with adaptation since 2013. It is now a dedicated program taken into account the various climate changes that an airport in the northern hemisphere must face.

Lastly, the program for Nature is the newest addition to the sustainability programs for CPH, as airports actively attempts to reduce and control certain species for flight safety the work to improve or reduce impact is a new task. CPH is still developing the program, however it is the ambition to improve nature on-site (where possible), reduce the impact through the value chain and work with nature restoration projects off-site.

6.1.1 Organization

The sustainability department at CPH is led by the Chief Sustainability Officer (CSO), who reports directly to the Chief Executive Officer (CEO). This reporting structure ensures high-level visibility, transparency and anchoring of sustainability efforts across all departments within the airport. The department is structured into four specialised teams:

Environmental Management and Compliance, this team is responsible for monitoring environmental pollutants and ensuring that airport operations comply with all relevant environmental regulations and legal requirements. Strategic Partnerships and Innovation, recognising that industry-wide collaboration is essential for a sustainable aviation future, this team focuses on building partnerships and driving innovation across the value chain. Sustainability Development, leading the development and coordination of the airport's overarching sustainability strategy. It is responsible for aligning activities across the five key sustainability programs and translating long-term goals into actionable plans. And lastly Energy management, tasked with driving energy efficiency and planning for future energy needs, this team ensures that the airport's energy supply is both reliable and aligned with its decarbonization goals.

6.2 Sustainability at Airoporti di Roma (ADR)

ADR is at the forefront of redefining the airport of the future by embedding sustainability and innovation into every aspect of its operations. Since initiating its sustainability journey in 2000, ADR has pursued ambitions goals, including a commitment to achieving net-zero emissions in scope 1 and 2 by 2030. This target is supported by key initiatives such as the installation of photovoltaic (PV) systems, the development of electrical and thermal storage, the purchase of renewable energy, and the electrification or biofuel conversion of its vehicle fleet. Similar initiatives marks CPH's strategy.

To address Scope 3 emissions, ADR has prioritised the availability of SAF and the promotion of intramodality. A standout example is the *FCO Connect* initiative, which facilitates seamless rail-to-air travel by allowing passengers to check in luggage in central Rome and collect it at their final destination.

Innovation is a central pillar of ADR's approach. In 2020, ADR launched its Innovation Hub, a platform for startups to propose creative solutions that support the airport's economic and social development. This initiative is complemented by a strong focus on circular economy principles and biodiversity, with targets such as reducing waste per passenger by 10% by 2030, composting organic waste onsite, implementing sustainable water management, and recovering materials from construction activities. ADR is also exploring innovative concepts like a “bio hotel”, further expanding the scope of its sustainability vision. Access to financial tools and expert consultancy has played a critical role in enabling the scale and speed of these initiatives.

ADR has also been a key promoter of the "Pact for the Decarbonisation of Air Transport", a national initiative that brings together industry players, institutional stakeholders, and associations to create a shared roadmap for CO_2 reduction across Fiumicino and Ciampino airports. Backed by scientific expertise from Politecnico di Milano, the pact exemplifies ADR’s leadership in cross-sector collaboration for climate action.

Lastly, ADR places high importance on culture. Reflecting its location in the heart of Italy, Fiumicino Airport functions as a “widespread museum”, showcasing Italy’s rich artistic and cultural heritage. The airport serves as a platform for emerging talents and major cultural events, blending travel with cultural promotion in a uniquely immersive experience.

6.2.1. Organization

ADR’s sustainability department is overseen by the Chief External Relations & Sustainability, who reports directly to the CEO, ensuring strategic alignment and visibility at the highest level of the organization.

The department is responsible defining, implementing, and monitoring sustainability strategies through a structured and collaborative approach. This work is carried out in close coordination with internal departments and external stakeholders and is aligned with both national and international best practices.

The sustainability office at ADR plays a key role in monitoring and reporting the company’s sustainability performance, with particular attention to environmental, social, and governance (ESG) impacts. It is also responsible for coordinating the Sustainability Rating process and informing top management of performance outcomes, including any gaps or areas for improvement. In addition, the department leads the double materiality analysis and manages ADR's broader ESG reporting activities. One of its core tasks is the preparation of the annual Sustainability Report, developed in collaboration with relevant departments and in full compliance with the European Sustainability Reporting Standards (ESRS), ensuring timely delivery and alignment with evolving regulatory requirements. This organizational structure supports the integration of sustainability into all areas of operation and decision-making.

6.3 Sustainability at Lithuanian Airports (LTOU)

LTOU and Vilnius Airport (VNO) operate under the principles of sustainable development, striving to balance economic, social, and environmental objectives in an integrated and strategic manner. One of LTOU's six core strategic goals is sustainability, described as a "Sustainability-Oriented Organizational Transformation." The company's sustainability efforts focus on implementing renewable energy solutions, improving noise management, and pursuing net-zero emissions. These initiatives are intended to increase energy independence, boost community satisfaction, and position LTOU as a national leader in environmental sustainability. Key focus areas include alignment with the European Green Deal, energy transformation, net-zero leadership, noise reduction, and enhancing diversity and inclusion across operations.

While the organization is actively working toward long-term objectives, most notably, a net-zero emissions target by 2030, the primary emphasis lies on how sustainability is managed daily. Although key performance indicators (KPIs) have been established and are being monitored, specific quantitative targets have yet to be finalized. Interim milestones include exploring the potential for implementing Sustainable Aviation Fuel (SAF), developing airport security processes and procedures, and enhancing staff training and development through the Professional Well-being Project.

Strategic goals for sustainability include reducing CO_2 emissions compared to baseline measurements, achieving compliance with the European Sustainability Reporting Standards (ESRS) by 2026, and maintaining an A+ rating on the Good Governance Index. Major ongoing actions support these ambitions and involve renewable energy transformation, the promotion of circular economy initiatives, comprehensive noise management, and improved sustainability reporting and communication practices. The airport is also engaged in discussions around biodiversity goals, especially where these intersect with flight safety. For example, greening certain zones of the airport is being considered to promote biodiversity, provided it does not compromise operational safety. Furthermore, the airport aims to finalize its waste management strategy by next year and is actively developing a water management strategy to improve processes such as aircraft de-icing.

6.3.1. Organization

In 2024, LTOU underwent an organizational restructuring that redistributed sustainability responsibilities across several departments. Unlike some other airports, LTOU does not have a dedicated sustainability department. Instead, sustainability functions are split between the Department of Law and the Department of Safety and Security. Environmental topics are divided accordingly, with responsibilities split between environmental compliance and sustainable aviation. Other aspects of sustainability are handled by various departments, reflecting a decentralized approach. Operational departments also contribute to managing sustainability-related changes, underscoring the cross-cutting nature of the agenda. The government plays a guiding role by setting expectations, and these are then reflected in LTOU's strategic documents, which define the sustainability agenda and set out long-term goals for the organization.

6.4 Sustainability at Centralny Port Komunikacyjny (CPK)

Sustainable development has been a core principle of the Centralny Port Komunikacyjny (CPK) Program from the outset. A key sustainability goal of the new airport project is to relocate aviation-related nuisances away from the densely populated areas of Warsaw. Another central ambition is to integrate the airport into a national network of high-speed rail connections, supporting more sustainable mobility. As a greenfield development, the project presents a unique opportunity to implement innovative, low-impact infrastructure and reduce the overall resource intensity of the transport system. One of CPK's major sustainability initiatives is its participation in the ALIGHT consortium, which has enabled the airport to access cutting-edge knowledge and technologies from leading European industries.

This collaboration has significantly shaped CPK's sustainability strategy, developed in 2023. The strategy establishes specific goals aligned with the ALIGHT consortium's priorities, including energy planning, energy demand reduction, and the implementation of smart energy management solutions. The strategy currently includes 97 Key Performance Indicators (KPIs), organized under seven overarching Sustainability Goals (SGs).

SG1: Energy efficiency, renewable energy production, reduction of greenhouse gas emissions, and mitigating air pollution

Efforts in this area include obtaining Airport Carbon Accreditation, measuring and reducing GHG emissions, increasing the share of public transport used by airport employees, installing charging infrastructure for zero-emission vehicles, and promoting the uptake of Sustainable Aviation Fuel (SAF), including tracking its share in total fuel usage.

SG2: Reducing water demand among other KPI's regarding water

This goal targets water demand reduction, with initiatives such as reusing greywater from washbasins to flush toilets in selected facilities and using rainwater from retention tanks for irrigation of green areas.

SG3: Applying circular economy principles

This goal includes prioritizing materials with minimal or recycled packaging, establishing biowaste collection systems, and ensuring the source separation of waste through well-distributed, color-coded bins.

SG4: Minimizing noise and pollution.

A key initiative here is the monitoring of acoustic performance during flight operations to identify and document particularly noisy aircraft.

SG5: Protecting biodiversity, including creating a green environment within the airport.

CPK plans to incorporate green roofs and façades and use biofiliac architectural designs to enhance ecological integration.

SG6: Developing and operating resilient infrastructure, focusing on resilience and risk management.

Focusing on infrastructure resilience and risk management the airport will increase the share of on-site energy generation in its supply mix and develop energy storage systems to ensure secure and sustainable energy flows.

SG7: Implementing sustainability development tools, including a sustainable supply chain.

This goal involves implementing sustainability development tools, with a focus on sustainable procurement and infrastructure. CPK intends to achieve sustainable building certifications and comply with the PAS 2080 carbon management standard to demonstrate leadership in transitioning to a low-carbon built environment.

The new airport is being designed to minimise energy consumption through advanced technologies, such as low-temperature ambient-loop heat distribution systems and to prioritise renewable energy sources, including solar power and geothermal energy. CPK is committed to reducing GHG emissions whole-life carbon emissions from its assets by using sustainable materials and methods and by promoting electric mobility.

Efforts also extend to minimising non-climate-related air pollution to ensure a healthy and safe environment.

The design team for CPK's fuel base has collaborated closely with Work Stream A on SAF implementation, and participation in Alight workshops has reinforced the importance of embedding sustainability into the design of the apron, surface access infrastructure, and passenger transport connections.

CPK's sustainability strategy outlines the operational targets to be achieved once the airport becomes operational. It serves as a key reference document for designers, ensuring that sustainability is integrated from the construction phase onward. The construction process itself adheres to stringent sustainability standards and is aligned with Building Research Establishment Environmental Assessment Method (BREEAM) certification requirements. These standards also reflect CPK's wider strategic goals.

6.4.1. Organisation

Currently, CPK does not have a centralized sustainability office focused on strategic problem-solving. Instead, sustainability responsibilities are distributed across various project divisions and coordinated by the ESG Team, which sits within the Strategy and Programme Management Department. Certification activities, including BREEAM compliance, are managed as an independent cross-sectional project within the Airport Department.

6.5 Sub-conclusion

The sustainability strategies of participating airports demonstrate a shared commitment to improving sustainability especially through energy efficiency, carbon management, and circular economy practices. Collaboration with initiatives like the ALIGHT consortium has been key in integrating cutting-edge sustainability tools and targets, particularly in areas such as renewable energy and SAF. While all airports align with international certification frameworks (e.g., ACA, BREEAM), implementation challenges, such as coordinating cross-departmental efforts, highlight the importance of centralised sustainability governance. Overall, airports are using major upgrades and greenfield development as opportunities to embed ambitious, measurable sustainability goals into both design and operations.

7. Conclusions

The ALIGHT project represents a structured step toward supporting the decarbonization of European airports by linking policy, technology, and implementation. With its focus on SAF and smart energy systems, the project has helped clarify both technical and organizational considerations for improving sustainability within the airport sector.

A central contribution of the project is its effort to make complex EU regulations—such as REDII/III, ReFuelEU, and CORSIA—more accessible for practical application in airport operations and SAF procurement. At the same time, the project highlights regulatory and certification gaps, particularly the lack of harmonization across sustainability standards.

Another key element of ALIGHT has been the collaboration between its partner airports. By sharing experiences and approaches, Copenhagen (CPH), Rome (ADR), Vilnius (VNO), and the planned Centralny Port Komunikacyjny (CPK) have each developed context-specific sustainability strategies that still align with overarching European ambitions. These strategies extend beyond carbon reductions to include water and biodiversity management, circular resource use, and organizational restructuring around ESG principles.

The project's broader impact lies in demonstrating how sustainability can be systematically integrated into airport planning, construction, and operation. While further progress depends on continued political support, funding, and regulatory clarity, the tools and insights developed through ALIGHT can help guide the sector as it works toward long-term climate and sustainability goals.

8. Glossary

Airport Carbon Accreditation (ACA)

A global certification program that assesses and recognizes airports' efforts to manage and reduce carbon emissions.

Airports Council International (ACI)

A global trade representative of the world's airports, advocating for policies and standards.

Auxiliary Power Unit (APU)

A small engine on aircraft that provides power while on the ground, often targeted for emissions reduction.

Battery Energy Storage System (BESS)

A technology used to store energy for use at a later time, important for renewable integration at airports.

Building Research Establishment Environmental Assessment Method (BREEAM)

A certification system for assessing the sustainability of buildings, used by airports for green construction.

Carbon Dioxide (CO_2)

The primary greenhouse gas emitted through human activities such as fossil fuel combustion.

Carbon Dioxide Equivalent (CO_2e)

A metric that expresses the global warming potential of different greenhouse gases in terms of CO_2.

Carbon Disclosure Project (CDP)

An international non-profit that helps companies and governments disclose and manage environmental impacts.

Clean Skies for Tomorrow (CST)

An initiative supporting the transition to sustainable aviation fuels and low-carbon flying.

CORSIA

A global offsetting scheme developed by ICAO to stabilize CO_2 emissions from international aviation.

Deliverable

A specific output or report produced during the course of the ALIGHT project to meet objectives.

Direct land use change (DLUC)

Land converted directly from one use to another (e.g., forest to farmland), often impacting GHG emissions.

Energy Efficiency Directive (EED)

EU legislation promoting energy efficiency improvements across sectors, including aviation.

Environmental, Social, Governance (ESG)

A framework for assessing an organization's sustainability and ethical impact.

European Emissions Trading System (EU ETS)

A cap-and-trade system that limits greenhouse gas emissions from certain sectors, including aviation.

European Green Deal

The EU's strategy to become climate-neutral by 2050 through sustainable economic growth.

European Sustainability Reporting Standards (ESRS)

Standards that define how companies in the EU must disclose sustainability-related information.

Fit for 55

A package of EU legislation aimed at reducing greenhouse gas emissions by 55% by 2030.

Fly Green Fund (FGF)

A Swedish initiative supporting voluntary contributions to scale up sustainable aviation fuels.

Greenhouse Gas (GHG)

Gases that trap heat in the atmosphere and contribute to global warming, including CO_2, CH_4, and N_2O.

Ground Power Unit (GPU)

An external device supplying power to aircraft on the ground, reducing reliance on APUs.

Ground Support Equipment (GSE)

Vehicles and equipment used at airports to support aircraft operations, increasingly being electrified.

Indirect land use change (ILUC)

Emissions caused when existing agricultural land is displaced due to biofuel production elsewhere.

International Civil Aviation Organization (ICAO)

A UN agency that sets international standards for aviation safety, security, and environmental performance.

International Sustainability and Carbon Certification (ISCC)

A certification system ensuring that sustainable aviation fuels meet environmental and social criteria.

Land use, land use change and forestry (LULUCF)

A sector covering land-based emissions and removals, relevant to carbon accounting and offsets.

Life Cycle Assessment (LCA)

An analytical method used to assess the environmental impacts of a product or system across its lifespan.

Lower carbon aviation fuels (LCAF)

Fuels that produce fewer lifecycle greenhouse gas emissions than conventional jet fuels.

Methane (CH_4)

A potent greenhouse gas with a global warming potential significantly higher than CO_2 over 20 years.

Net zero

A target to balance emitted and removed greenhouse gases, aiming for no net increase in atmospheric GHGs.

Nitrous Oxide (N_2O)

A greenhouse gas emitted from agricultural and industrial activities, and aviation to a lesser extent.

Non-CO_2 effects

Climate impacts of aviation beyond CO_2 emissions, including contrails and nitrogen oxides.

Power Purchase Agreement (PPA)

A contract to buy electricity directly from a renewable energy producer at agreed terms.

Paris Agreement

A global treaty under the UNFCCC aiming to limit global temperature rise to well below 2°C.

Planetary boundaries

A concept identifying limits within which humanity can safely operate to avoid environmental collapse.

ReFuelEU Aviation (RFEUA)

EU regulation requiring increased use of sustainable aviation fuels at European airports.

Renewable Energy Directive (RED)

EU legislation promoting the use of renewable energy sources, including biofuels in aviation.

Roundtable on Sustainable Biomaterials (RSB)

A global standard and certification body for sustainable biomaterials, including SAF.

Science Based Target initiative (SBTi)

A framework helping companies set emissions reduction targets aligned with climate science.

Scope 1 emissions

Direct emissions from owned or controlled sources.

Scope 2 emissions

Indirect emissions from the generation of purchased electricity, steam, heating, or cooling.

Scope 3 emissions

All other indirect emissions occurring in a company's value chain.

Sectoral Decarbonisation Approach (SDA)

A methodology to set science-based emissions targets based on sector-specific pathways.

Sustainable Aviation Buyers' Alliance (SABA)

An initiative helping corporates and airports invest in and scale sustainable aviation fuels.

Sustainable Aviation Fuel (SAF)

Renewable fuels that can replace conventional jet fuels and significantly reduce lifecycle emissions.

Sustainable Development Goals (SDG)

17 global goals adopted by the UN to address poverty, protect the planet, and ensure prosperity.

Union Database (UDB)

An EU system tracking the sustainability of biofuels and SAF across the supply chain.

United Nations Global Compact (UNGC)

A voluntary UN initiative encouraging businesses to adopt sustainable and socially responsible policies.

Work package (WP)

A package of task and group of activities within the ALIGHT project, each with specific deliverables and timelines.

Workstream

A focused area of activity within the ALIGHT project, often crossing multiple work packages.

World Wildlife Fund for Nature (WWF)

An international NGO working on nature conservation and environmental sustainability.

8.1. Mentioned deliverables in this report

Deliverable Number	Title of Deliverable
2.2	Guidance on sustainability criteria and best practice framework
3.2	Tools for fuel logistics, quality monitoring and accounting
3.3	Report on broader environmental benefits
4.1	Fossil Free Airport Roadmap report - infrastructure, supply etc.
4.3	Best Practices for Smart Energy Supply and management
5.1	Greening of Ground Equipment and Passenger Transport
5.2	Greening of Airport Buildings with a smart energy management
5.3	Design manual for Aircraft Stand of the future
6.1	Guidance on procurement of SAF for EU airports
6.2	Final report of SAF for airport sustainability
6.3	GHG monitoring system
6.5	Results for Cost Benefit of Smart Usage scenarios of SAF
6.6	APU emission control system methodologies
8.7	Replication Toolbox for Smart Energy
9.5	Detailed report on smart energy solutions transferred and tailored in fellow and other airports

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