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# **Collaboration with existing initiatives and Clustering with other EU projects V1 M24**

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### Abstract

This report describes the clustering activities and future potential of EU funded projects developing concepts and technologies to accelerate the decarbonisation of the aviation sector in the EU with a specific focus on sustainable airport operations. It defines the six areas of potential cooperation/collaboration amongst four selected projects and describes the achievements made so far.

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## VI. LIST OF ACRONYMS

Acronym	Meaning
ACI	Airport Council International
AFIF	Alternative Fuels Infrastructure Facility
ARC	Airport Regions Council
ASTM	American Society for Testing and Materials
AZEA	Alliance for Zero-Emission Aviation
CEF	Connecting Europe Facility
CINEA	European Climate, Infrastructure and Environment Executive Agency
DG RTD	Directorate-General for Research and Innovation
EC	European Commission
EU	European Union
EU GD	European Green Deal
GA	Grant Agreement
GD-SO	Green Deal Support Office
GD-SO UM WG	Green Deal Urban Environment and Mobility Working Group
GHG	Greenhouse Gas
GSE	Ground Service Equipment
H2020	Horizon 2020 Research Programme
ICAO	International Civil Aviation Organisation (UN)
MAGPIE	sMArt Green Ports as Integrated Efficient multimodal hubs
OLGA	hOListic & Green Airports
PIONEERS	PORTable Innovation Open Network for Efficiency and Emissions Reduction Solutions
PO	Project Officers
PV	Photo Voltaic
SAF	Sustainable Aviation Fuel
SSMS	Smart and Sustainable Mobility Strategy
STARGATE	SusTainable AiRports, the Green heArT of Europe
TEAB	Tulips External Advisory Board
TEN-T	Trans European Transport Network
TRL	Technology Readiness Levels
TULIPS	demonstrating lower polluting solutions for sustainable airPorts across Europe
UFP	Ultra-fine Particles
WP	Work Package



# 1 Executive Summary

The following report describes the current collaboration and potentials of clustering and cooperation of selected EU-funded projects that aim to innovate on the reduction of waste and greenhouse gas emission from airport operations in Europe. It contextualises the need to achieve this reduction within the scope of the European Green Deal (EU GD) and its related EU initiatives.

As a baseline, relevant initiatives and frameworks as well as related projects are identified. A strong priority is put on the aviation related projects from the H2020 Green Deal Topic on 'green airports and ports as multimodal hubs for sustainable and smart mobility' including TULIPS (GA 101036996), OLGA (GA 101036871), STARGATE (GA 101037053) and the ALIGHT Project (GA 957824) funded through the H2020 topic for 'Smart Airports'. The document provides a brief introduction to each of the related projects to highlight their core objectives.

The main section of the report provides the results of the analyses of potential synergies between these projects which are categorised as 1) SAF, 2) Airside operations, 3) Energy, 4) Intermodal Transport Hubs, 5) Circular Airports, 6) Airports and Terminals. It stresses that, based on these categories, working groups could be established for better cooperation and coordination amongst the relevant projects. Furthermore, the categories can be useful as a baseline to develop joint high-level KPIs to assess the progress towards achieving the EU Green Deal targets in the transport sector, specifically related to sustainable airport operations in Europe.

The report then lists the clustering activities undertaken by the projects to share knowledge, to avoid duplicated or contradicting actions and to perform joint dissemination activities that consolidate the individual project work within the context of agreed EU frameworks to combat climate change.

In this context the report captures the early achievements and identifies the potential contributions from the cluster towards improved implementation of relevant EU Initiatives including the TEN-T Network Regulation, the Smart and Sustainable Mobility Strategy, ReFuelEU, the Fit for 55 Programme and the Circular Economy Action Plan.

The document concludes that the current clustering activities are in line with the expected performance and that the work will continue, where feasible, within individual working groups related to the focus areas identified through the synergy analyses. Some key events for clustering were already identified with additional projects to be added during the course of the 2024. The projects' contractual obligations, however, are considered below the potential contribution of an active cluster. Additional potential could be exploited through external support and clearer governance structures and budget allocation that supports the internal clustering activities.



## 2 Introduction

The TULIPS Project is part of a large-scale innovation action that addresses the immanent need to increase the sustainability of the transport sector in the EU. This effort is directly linked to the European Green Deal (EU GD), which centres around the ambitious target of reaching climate neutrality for the European continent by 2050. To achieve this ambition, all systems and networks that are operated on the continent to sustain its social and economic prosperity need to be adapted towards a drastic reduction of environmental impact, whilst retaining their ability to deliver maximum benefits to society.

For the transport sector, as one of the primary sources of EU GHG emissions, this is a major challenge as any quick adaptation to the system is likely to provoke increasing costs or a loss in efficiency before coming to a new equilibrium. To avoid a suffocating effect, sufficient momentum needs to be built through the definition of generally accepted patterns of change. This is particularly true for the aviation industry, which is considered one of the most challenging transports modes to decarbonise within the given time span. Fragmented solutions that aim to address an overarching challenge must be avoided in order to ensure uptake of the recommended adjustments. With both time and resources being finite in the uphill battle against climate change, a pertinent and coordinated solution is essential for the aviation industry's ability to contribute towards a more sustainable transport sector.

In recognition of this, the European Commission have segmented the research and innovation programs within the aviation sector into different areas of impact, linked to different strategies and regulations. The TULIPS Project is located in a cluster aiming to develop and demonstrate concepts and technologies to accelerate the systemic transformation of existing airport and port infrastructures towards '[green airports and ports as multimodal hubs for sustainable and smart mobility.](#)'

To ensure that the efforts made by each of the projects will respond to the overarching programme in a resource efficient, coordinated and non-contradictive way, regular exchange and inter-project coordination is vital. From an aviation related perspective, it is also important to look beyond the borders of the direct programme under which the green airports and ports project were funded. Here it will be important to also look into other related actions funded under e.g. the Smart Airports Topics in Horizon 2020, the Connecting Europe Facility (CEF), the Alternative Fuels Infrastructure Facility (AFIF) or the upcoming aviation related projects from the Horizon Europe - Work Programme 2023-2024 on Climate, Energy and Mobility.

The following clustering report will reflect on the ongoing clustering activities achieved within the past 18 months and provides perspective on potential future clustering activities. It is focused on



the aviation sector for which it highlights potential working groups and proposed actions to achieve greater coordination of the individual project outputs.

## 2.1 General Purpose

The Tulips project has assigned a task to 'Collaboration with existing initiatives and clustering with other EU projects' (T12.5) within the project's communication and dissemination work (WP12) Within this task, the project has committed to:

1. Filter the EU initiatives "longlist" into a prioritised "shortlist" for targeted active engagement. To enable a high quality of interaction for optimal value, a shortlist containing between 5-15 projects covering a range of relevant domains is anticipated (e.g. Transport, Energy, Circular Economy)
2. Pursue an integrated management of information within the H2020 community. Special attention will be given in coordination and clustering with the consortia awarded projects under this Green Deal call.
3. Engage the EC and request support to obtain contact details for specific initiatives, as required.
4. Identify and explore opportunities for information sharing, cooperation and "clustering" with the priority initiatives and identified project.

The WP management decided to prioritise actions towards the coordination and clustering with the consortia awarded projects under the call on green airports and ports (Bullet point 2 above).

## 2.2 Objectives of the report

In June 2022, EU Green Deal (EU GD) sister projects TULIPS, OLGA, and STARGATE jointly issued an internal clustering report<sup>1</sup>. The document presented an initial roadmap on how the sister projects planned to work together on common topics, demonstrating the desire to actively search for synergies to fulfil the GD objectives and jointly maximise the projects impact in the longer term.

This report builds on the previous internal clustering report, with the objective to:

- Update the initial clustering report.
- Report on the joint activities undertaken as a cluster.
- Identify potential for future collaboration activities and share lessons learnt.

The clustering report also aims to specify areas of cooperation (synergies) as the baseline for:

- Internal activities on clustering efforts and sharing lessons learnt with a focus on technical synergies like sustainable aviation fuels, energy and air quality.
- Joint communication and dissemination activities (events, press releases, social media material, scientific publications and website mentions).

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<sup>1</sup> Clustering report, OLGA / STARGATE / TULIPS, June 2022



### 3 Initiatives/Frameworks Identification

Beyond the projects primary purpose of supporting the steady implementation of the European Green Deal within the domain of airport operations in Europe (also see [section 9.1](#)), the following Pan-European initiatives/frameworks are considered as relevant common guidelines for the projects clustering approach:

- The review and implementation of the TEN-T Network Regulation (see [section 9.2](#))
- The Implementation of the Smart and Sustainable Mobility Strategy (see [section 9.3](#))
- The Implementation of ReFuelEU (see [section 9.4](#))
- The implementation of the Fitfor55 Programme (see [section 9.5](#))
- The implementation of the Circular Economy Action Plan (see [section 9.6](#))

Each of the clustering activities should be organised to increase the impact towards one or multiple objectives defined through these initiatives.

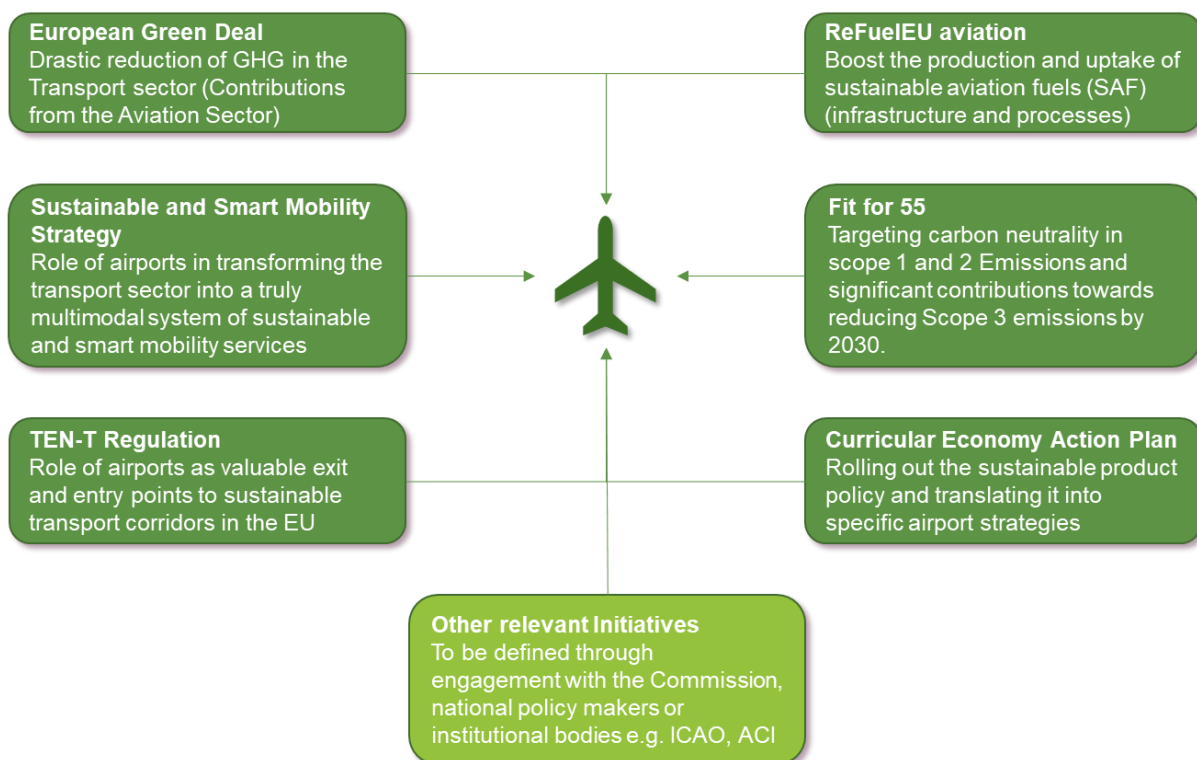


Figure 1 Relevant EU Initiatives and Strategies for Green Airports.



## 4 Project Identification

In line with the clustering objectives defined in [Chapter 2.2](#), projects from Topic 5 of the Green Deal Calls on ‘building a low-carbon, climate resilient future’ were considered most important for coordination and clustering.

Although connections are likely to exist with many of the projects funded under the Green Deal topics and the [PULSAR](#) Network (See [Appendix A](#)), the focus for clustering was initially on the sister projects from Call Topic LC-GD-5-1-2020 (see Table 1 below). This decision was based on the commonalities defined by the overarching topic and the need to exploit synergies efficiently with limited clustering resources made available to the individual projects. This approach works close to the intended structure of the Green Deal Support Office (GD-SO), which has identified a designated working group for ‘urban environment and mobility’ (also see [section 8.1](#)).

*Table 1 Mobility projects in the GD-SO Working Group urban environment and mobility*

Project	Grant Agreement	Focus
TULIPS	GA 101036996	Airports
OLGA	GA 101036871	Airports
STARGATE	GA 101037053	Airports
PIONEERS	GA 101037564	Ports
MAGPIE	GA 101036594	Ports

Amongst the five projects of the LC-GD-5-1-2020 call topic, the greatest potential for synergies has been identified between the three airport projects – TULIPS, OLGA and STARGATE. It is expected that there will be the highest volume of clustering activities achieved between these three airport projects, highlighting why coordination and joined communication will be more efficient in comparison with the seaport projects.





Figure 2 Call Topic LC-GD-5-1-2020 Green airports and ports as multimodal hubs for sustainable and smart mobility.

Beyond the three airport projects funded under Topic LC-GD-5-1-2020 (see Figure 2 above), the cluster saw reason to integrate the ALIGHT Project (GA 957824), which is funded through the H2020 CL3 Topic (also see [section 5.1](#)). The reason to directly include ALIGHT follows the logic of the PULSAR Network that jointly monitors and steers the progress made through EU-funded research and innovation towards sustainable aviation in the EU. Within PULSAR, the category of sustainable airport operations is composed of TULIPS, STARGATE, OLGA and ALIGHT which will be adopted for the clustering efforts described in this report. By this approach other projects from the PULSAR Network (see [Appendix A](#)) are not excluded. PULSAR is considered a key stakeholder for the joint communication and dissemination of the cluster for the overall coordination of results.

Throughout the first two years of the TULIPS Project, several exchanges between ALIGHT, TULIPS, OLGA and STARGATE suggested that clustering activities should be further pursued. Beyond the constant exchange between the Green Airport Projects (refer to [section 7](#)) the project also targeted industry-wide forums such as the Green Deal ‘Urban Environment and Mobility Working Group’ and Alliance for Zero-Emission Aviation (AZEA) (refer to [section 8](#)) in addition to specific frameworks and initiatives (please also refer to [section 9](#). Figure 3 below illustrates a high-level overview of the clustering landscape for the green airports cluster.



Figure 3 Clustering Landscape for Green Airports and Ports

The projects from [CEF Transport](#) and [AFIF](#) funded projects and the first set of projects coming to conclusion within the [Innovation Fund](#) managed by CINEA are not included in the landscape illustrated in Figure 3 above. These projects are not yet subject to the permanent clustering activities of the Green Airports Cluster but there would be added value in integrating their outputs into the larger picture as contributions to the initiatives identified in [section 3](#).



## 5 Engagement with sister projects

### 5.1 Green Airports Projects

The objective of clustering for the European Commission (EC) Directorate-General for Research and Innovation (DG RTD) and CINEA is to stimulate exchange and coordination amongst projects and to ensure consistent feedback in line with the topic's requirements in the longer term.

It is in this context the projects TULIPS, OLGA, and STARGATE have shown the highest clustering potential due to their common focus on aviation and airport operations in particular. Each sister project contains one Lighthouse Airport, where several project initiatives will be first tested and validated, and three Fellow Airports, where successful initiatives will be replicated. The same holds for the H2020 funded ALIGHT Project. Within the scope of the TULIPS clustering these four projects can be categorised as “Green Airport Projects” (see Table 2 below).

*Table 2: Airports and partners in sister/ related projects*

Programme Project	Green Deal			Smart Airports
	OLGA	STARGATE	TULIPS	ALIGHT
Lighthouse airport	Paris CDG	Brussels Airport	Schiphol Airport Amsterdam	Copenhagen Airport
Fellow airports	Zagreb Cluj Napoca Milan-Malpensa	Toulouse Athens Budapest	Oslo Turin Larnaca	Rome Vilnius Warsaw
Partners	41	22	32	16

The three green airport projects from the Green Deal programme and ALIGHT from the Smart Airports Topic in H2020 Programme serve as valuable inputs and groundwork for other initiatives and projects in the sustainability field, ultimately improving the quality of life of European citizens and providing solid grounds for a sustainable future of the continent. In the following sections, a quick overview of the projects individual focus areas is provided.

#### 5.1.1 TULIPS

TULIPS programme focuses on developing innovations that facilitate the transition to low-carbon mobility and enhance sustainability at and around the airports. With the leadership of Royal Schiphol Group, a broad collection of 31 representatives from airports, airlines, knowledge institutes and industrial partners work together in the consortium intending to speed up and roll out sustainable technologies in aviation and significantly towards zero emissions and zero waste airports by 2030 and climate neutrality by 2050.

Schiphol Airport will play a key role to demonstrate initiatives, and the other consortium partner airports, such as Oslo, Turin and Larnaca will implement the following challenges for the fulfilment of the programme:

- Reducing or eliminating vehicle emissions.
- Testing facilities for recharging aircraft with electricity or hydrogen.
- Introducing and optimising large scale supply of Sustainable Aviation Fuel (SAF).
- Improving circular use of materials.
- Carrying out airside demonstrations to capture ultra-fine particles from departing to landing flights.
- Examining the entire journey of passengers and cargo with solutions proposed for an optimal mix of multimodal solutions.

For detailed information please refer to: <https://tulips-greenairports.eu/>

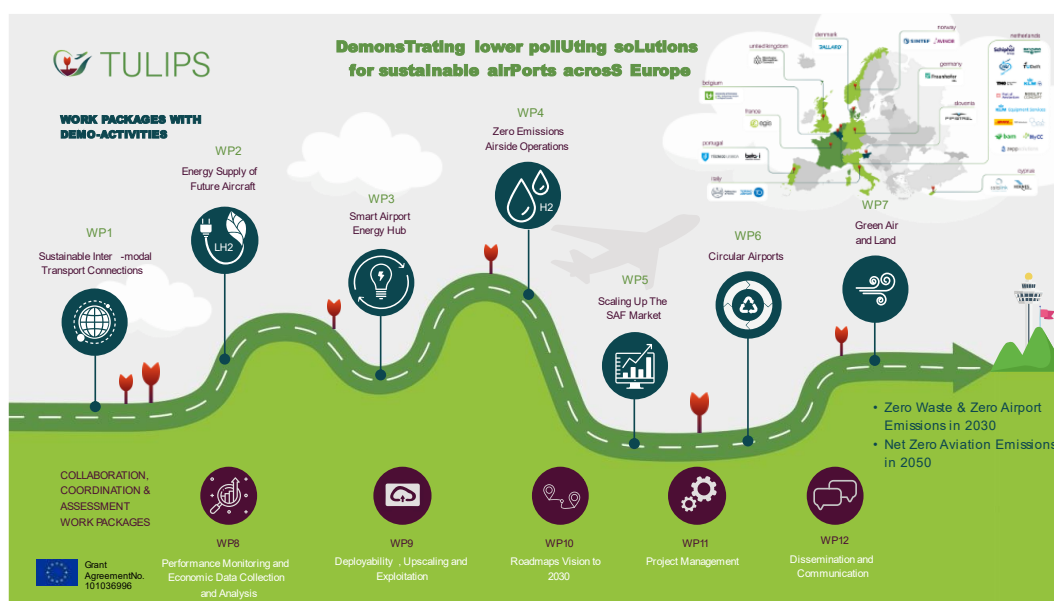


Figure 4 Overview of the TULIPS Project

## 5.1.2 STARGATE

The project focuses on developing innovations and initiatives for an accelerated transition to greener aviation. Together with a diverse consortium of 21 partners, Brussels Airport takes the lead to demonstrate that sustainable aviation is possible. Collaboration across the industry is essential to achieve ambitious goals. The partnership consists of three other European airports (Athens, Budapest, and Toulouse), airlines, several airports community partners, as well as knowledge institutions and local authorities.

STARGATE covers the development, testing and implementation of around 30 confirmed projects, focusing on three main areas:

- Further decarbonisation of the airport operations.
- Improving the local environmental quality.
- Stimulating the modal shift.

For detailed information please refer to: <https://www.greendealstargate.eu/>



## Three major axes, over thirty projects



Figure 5 Overview of the Stargate Project

### 5.1.3 OLGA

OLGA contributes to solving the complex challenge of environmental transition at airports by implementing a wide variety of environmental innovations (30 tasks in WP2-6), in a holistic approach. The project is coordinated by Aeroports de Paris (Groupe ADP), with Paris Charles de Gaulle Airport as the lighthouse airport, and with Zagreb Airport as a partner, followed by fellow airports Milan-Malpensa and Cluj. With the 2024 Summer Olympics in Paris and 2026 Winter Olympics in Milano-Cortina, OLGA's airports are uniquely positioned to showcase the environmental innovations, while the airports of Zagreb and Cluj will prove scalability and EU-wide applicability. OLGA thrives to demonstrate innovative environmental solutions applicable to the consortium's member airports and capable of being replicated on a European scale. The solutions are intended result in a proven CO<sub>2</sub> reduction, air quality improvement and biodiversity preservation with involvement of the entire sector's value chain. The OLGA results will generate positive societal, environmental, and economic impacts that will spread to the local, national and European level. This will be achieved through increases to environmental performance from a:

- Flight operations perspective
- Passenger and freight perspective
- Community perspective

For detailed information please refer to: <https://www.olga-project.eu/>



## Holistic environmental performance at airports

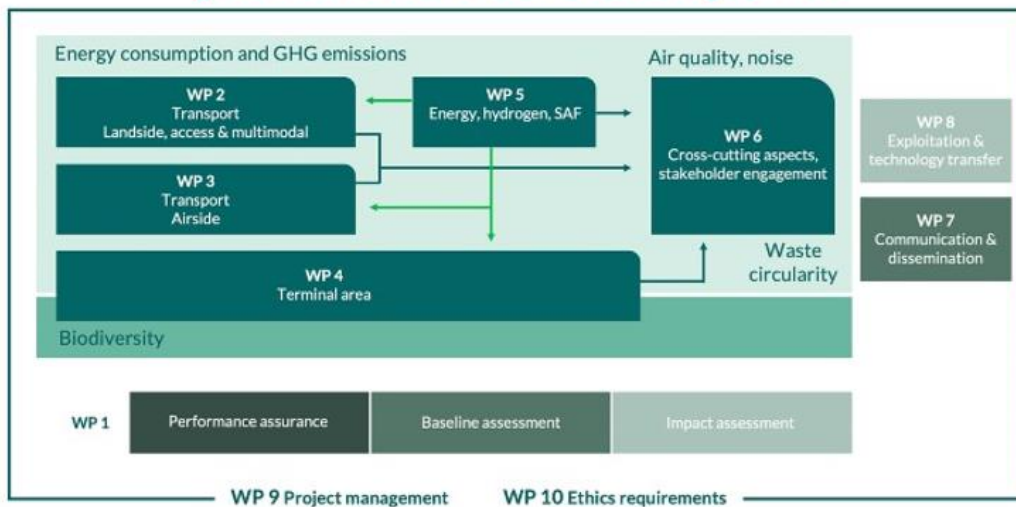


Figure 6 Overview of the OLGA Project

### 5.1.4 ALIGHT

ALIGHT is a project that focuses on infrastructure for sustainable aviation fuel and renewable energy sources for ground activities. With Copenhagen Airport as the lighthouse, the project aims to make the use of SAF more efficient and cost-saving by means of improving the logistics chain and SAF uptake process in airports, additionally seeking to integrate smart renewable energy - solar energy (photovoltaic-systems), heat pumps and battery energy storage initiatives with smart transport infrastructure, e.g., e-Transport, and EV-chargers to enhance e-mobility. TULIPS has collaborated with ALIGHT at various events (including ReFuel in Brussels, PTE and SAF events in Amsterdam, and the NACO event in The Hague). Further, ALIGHT sit on the TULIPS advisory board to engage in the shared knowledge development of SAF, energy and air quality topics.

For detailed information please refer to: <https://alight-aviation.eu/about-us/airports>

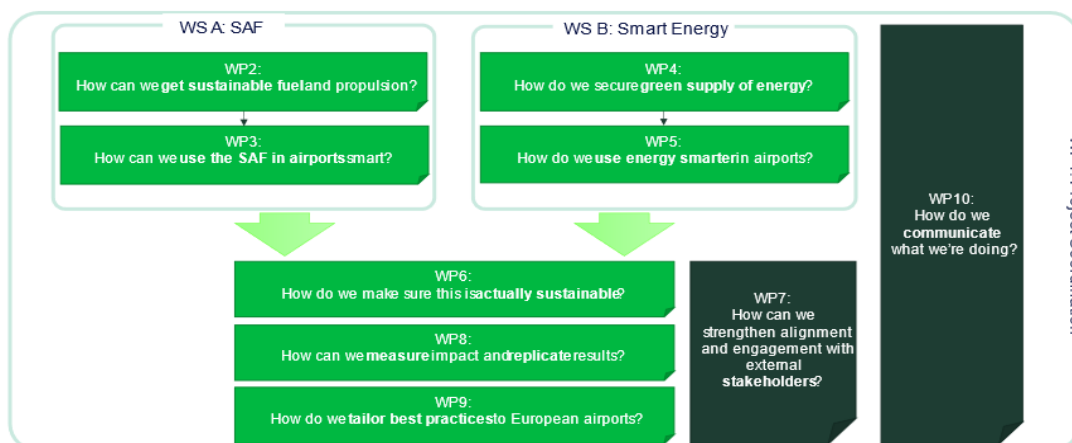


Figure 7 Overview of the ALIGHT Project



## 5.2 Combined objectives of cluster projects

The four projects of the Green Airports Cluster including TULIPS, OLGA, STARGATE and ALIGHT are each working towards real-life high Technology Readiness Levels (TRL) demonstrations of green airports with the ambition to significantly contribute to the ongoing EU initiatives identified in [section 3](#). Their combined objective is to share and consolidate knowledge and to harmonise their outputs alongside the focus areas identified in [section 6](#). These focus areas are based on the conceptual and technical synergies within the cluster following the four headings of the [Green airports and ports as multimodal hubs for sustainable and smart mobility Call](#), collectively describing the various airport aspects to be considered:

- 1) Transport
- 2) Terminal
- 3) Energy
- 4) Cross-cutting aspects.

A link of these four headings into the six synergies can be found in [Appendix B](#). The performance and joint output from the working groups related to each focus area will be limited by the resources made available.

At the end of the road the European Green Deal is aiming for a new paradigm in the aviation industry that demands net-zero airport operations across the continent. Pushing this new paradigm into practice will require significant actors in the aviation industry to set sail for a traceable journey towards common practices. In this regard, the clustering approach has the potential to provide a significant advantage over driving the intended impact at project level as the combined scope of TULIPS, OLGA, and STARGATE and ALIGHT reaches more than 20 different European countries, [16 airports](#) (both small and big) with approx. 440 million passengers a year (ACI 2019) (see Table 3 below).

*Table 3: Initial reach of the Green Deal Sister projects and ALIGHT*

Project	OLGA	STARGATE	TULIPS	ALIGHT	Total
<b>Partners</b>	41	22	29	18	110
<b>Airports</b>	4	4	4	4	16
<b>Universities</b>	3	2	4	2	11
<b>Airlines</b>	1	3	1	1	6
<b>Passengers/y (2019)</b>	143.1 mio	77.7 mio	115.3 mio	103.4 mio	439,5 mio

The projects serve as valuable inputs and groundwork for other initiatives and projects in the sustainability field, ultimately improving the quality of life of European citizens and providing solid grounds for a sustainable future of the continent.



## 5.3 Clustering with Sea Ports

### 5.3.1 PIONEERS

#### **PIONEERS**

Portable Innovation Open Network  
for Efficiency and Emissions  
Reduction Solutions

Led by the Port of Antwerp and with the participation of the ports of Barcelona, Constanta and Venlo, the EU-funded PIONEERS project is a consortium comprising 46 partners that will showcase a range of activities for the reduction of greenhouse gas emissions in ports while safeguarding competitiveness. PIONEERS will develop specific solutions to reduce carbon emissions in the sector, with the aim of transforming ports into green infrastructures by 2050. Solutions include the implementation of green port innovation demonstrations on clean energy production and supply, the deployment of electric, hydrogen and methanol vehicles, sustainable port design, modal shift and flow optimisation, and digital transformation through AI and 5G-based digital platforms.

### 5.3.2 MAGPIE



The EU-funded MAGPIE project will embark on 12 pilot activities in three key areas: alternative energy sources; smart technologies applied to power operations; and river and rail connections with the hinterland. The ports of Rotterdam (Netherlands) and Sines (Portugal), as well as Haropa Port (France) and the DeltaPort association (Germany) are supporting the project. MAGPIE will combine the accelerated introduction of green energy carriers with logistics optimisation in ports through automation and autonomous operations. The project will demonstrate technical, operational and procedural energy supply solutions to stimulate a green, smart and integrated multimodal transport, and guarantee their implementation through the European Green Ports of the Future Master Plan.

### 5.3.3 Conclusion on the integration of the PORT Projects

Both Sea Port Related projects were considered throughout the clustering activities in 2023 and a joined meeting with all green airport and port project was organised by STARGATE on 31 January 2023. Although the projects have similar overarching subjects (e.g. hydrogen infrastructure), the operational aspects differ. It is yet to be clarified to what extent a clustering attempt across the different modes of transport can add to the overall impact of the research and innovation actions.



## 6 Synergies / Focus areas

The collaboration between the three EU GD sister projects and ALIGHT can benefit from a shared vision of supporting the implementation of the EU GD through accelerating the environmental transition of operations at airports. To get a more differentiated view on this joint vision, and the unique opportunity to exchange experiences, good practices, limitations, and recommendations at work package level, an analysis of potential synergies was performed to identify common topics that consolidate the project's individual ambitions.

Lessons learnt within these topics will be captured and complemented by examples from each project to develop a library of good practices, given as recommendations in the final clustering report. The overarching focus, however, will be to coordinate the individual work efforts for increasing the impact for the implementation of the EU Green Deal in the aviation sector. This library of good practices developed jointly by the four projects will be shared with end-users towards the end of the projects, where possible. This section provides details on the most prominent technical synergies identified and their translation into potential focus groups within the cluster.

*Table 4 Green Airports Focus Areas*

Focus Group	Subject
1	Sustainable aviation Fuels (SAF)
2	Airside Operations (Hydrogen)
3	Energy
4	Intermodal Transport
5	Circular Airports
6	Airports and Terminals

A high-level attribution of the Cluster Projects to the focus area can be observed in Figure 8 below

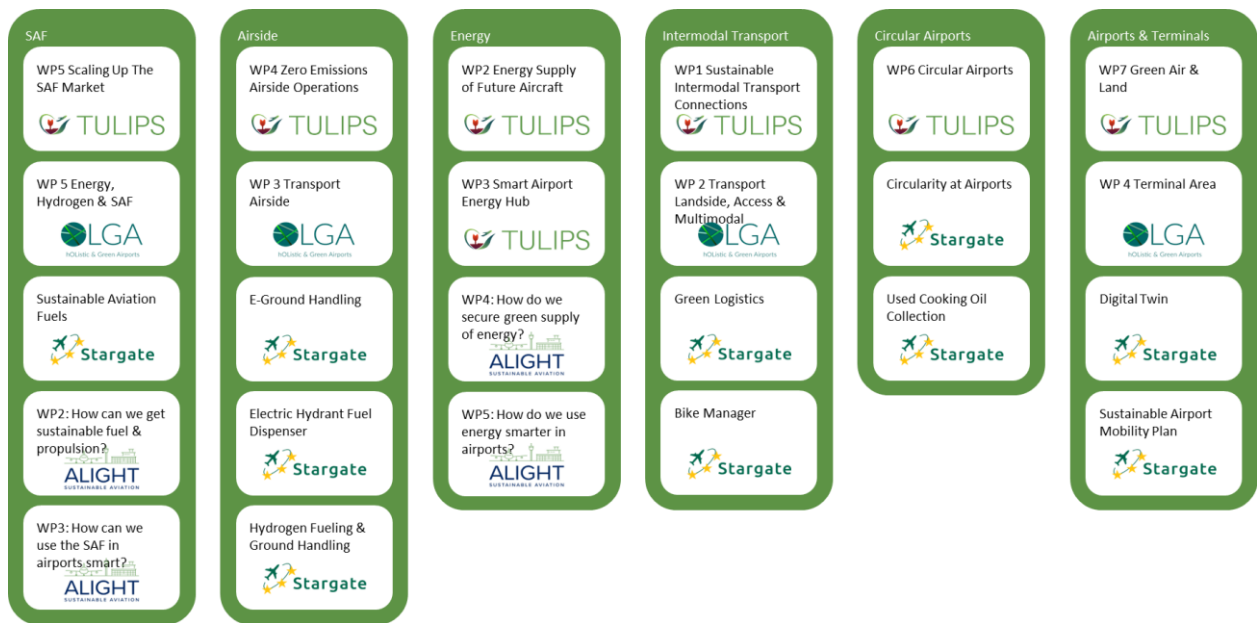


Figure 8 Attribution of technical synergies / focus areas in the Green Airports Cluster

## 6.1 SAF

All four projects aim to increase the uptake of Sustainable Aviation Fuels (SAF) through the demonstration of large scale SAF supply and incentives for airports to increase SAF usage. This translates into several activities throughout the SAF value chain, as summarised in Figure 9 hereafter.

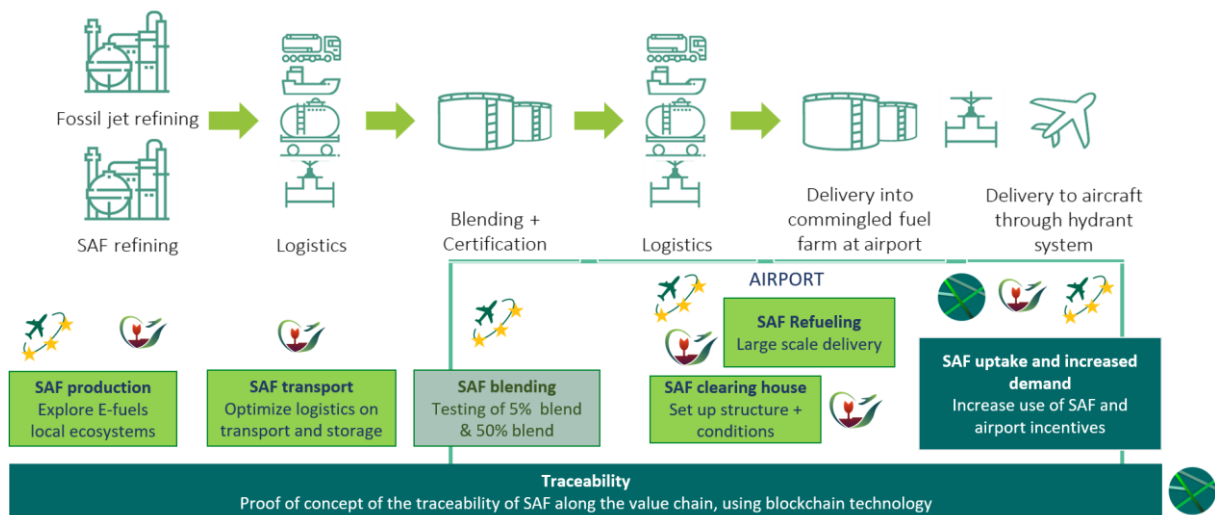


Figure 9 Three complementary projects to tackle the SAF challenge.

The cluster will support the development of new SAF production capacity, including power-to-Liquids and SAF production technologies that are not yet certified for use in commercial aviation.



- TULIPS demonstrations will cover SAF production, transport and refuelling. Importantly, TULIPS will prepare an independent, autonomous and EU-based Clearing House platform to assist SAF providers through the lengthy and costly ASTM fuel certification process.
- STARGATE will explore the feasibility of implementing a biofuel blending installation at Brussels Airport to enable different blending ratios depending on airlines preferences.
- OLGA will validate an overarching traceability process and system to create transparency in the level of SAF use to trace SAF production. This will stretch from data acquisition and security, to assessing the sustainability of the SAF, cross-checking with SAF combustion testing, performing a technical assessment of the climate impact of SAF, and allocate advanced SAF to Air France flights.

## 6.2 Airside Operations (Hydrogen)

The cluster will also investigate the use of hydrogen (H<sub>2</sub>) fuelled and electrified equipment with a number of demonstrations. OLGA considers airports as “Hydrogen hubs” for ground vehicles (short term) and aircraft (long term) by demonstrating H<sub>2</sub> production with an electrolyser, H<sub>2</sub> usage in mobility and master planning of an H<sub>2</sub> airport design. No common metric applies across the cluster however plans exist for the use of H<sub>2</sub> for ground vehicles:

- STARGATE targets ten successful tests for hydrogen usage for ground vehicles and service equipment and two vehicles running on hydrogen.
- TULIPS aims to deliver validated prototype of a hydrogen powered GPU and a hydrogen-powered tow tractor at the end of the project.

Finally, STARGATE will design a Digital Twin to bring together real and virtual data to create a virtual replica of the airport which can be used to explore the impact of decarbonisation strategies. By reliably forecasting the future energy and emissions behaviour of the airport, the Digital Twin will visualise and evaluate the net zero carbon roadmap of the airport to ensure that targets can be met.

## 6.3 Energy

Energy is another key synergy for our sister projects with a switch to less GHG-intensive electricity and heat production and increasing the energy efficiency of terminal operations. This is summarised in Figure 10 Three complementary projects in complex energy times hereafter.

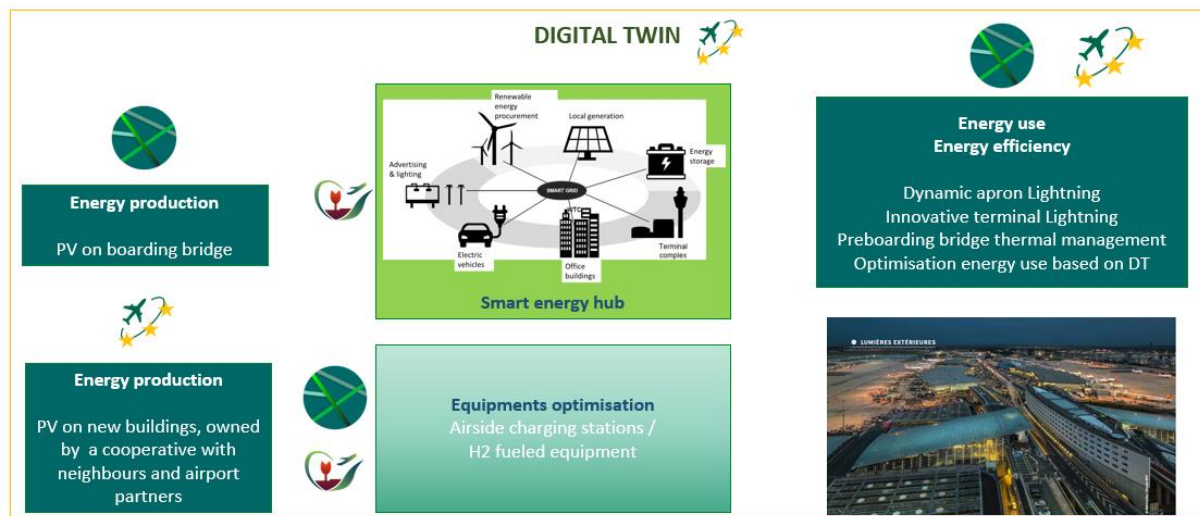


Figure 10 Three complementary projects in complex energy times

Both OLGA and STARGATE will look into energy production with the deployment of PV systems and using this energy to power airport operations. OLGA will drive improvements in energy use and energy efficiency through several initiatives.

TULIPS will focus on grid optimisation, by developing the concept of a Smart Energy Hub for airports, focussing on solar powered, intelligent DC charging infrastructure for electric vehicles like aircraft & airport logistics vehicles, and its integration to the built environment.

## 6.4 Intermodal Transport.

TULIPS and OLGA actively address the subject of greening airports from the perspective of increasing sustainable intermodal transport options at airports across the continent. Both projects have the ambition to increase the number of passengers that use low or zero emission vehicles to travel from and to airports as well as within the airport facilities and on the apron. Similar approaches are targeted for sustainable logistics from and to the airports in TULIPS and STARGATE. Early exchanges between TULIPS and OLGA were made during the OLGA-EU Green Deal solutions for smart and sustainable mobility at airports event at the European Parliament in Brussels on 6<sup>th</sup> December 2023. During the event, members from TULIPS and OLGA were able to form a common interest group which met for the first time on 20<sup>th</sup> December 2023 to exchange the projects' individual pathways and discuss potential fields of cooperation.

## 6.5 Circular (cyclical) Airports

The core of the clustering activities towards circular airport management will be led by the engagement of the consortia from STARGATE and TULIPS which have active work packages aiming at the related innovation in this field. The potential for clustering of the two projects is based on similar objectives and sharing experiences for mutual growth regarding frameworks and best



practices as well as applicable tools and resources for airports. Both outputs will also be relevant for the airports represented in the other cluster projects although no active development part is expected from them. Additionally there is a potential to facilitate the definition of circularity standards for airports in line with the spirit of the EU Circular Economy action plan (see [section 9.6](#)) Relates standards in this context are ISO regarding standards for Circular Economy (323) and construction (350) for which early engagement already took place. A successful contribution however will require a clear pathway and additional external support. A collaborative working group to focus specifically on circular economy at airports was scheduled to take place on 22<sup>nd</sup> January 2024. Tulips has initiated a knowledge sharing website under [www.zerowasteairport.com](http://www.zerowasteairport.com) , which will be open for contributions from other projects or affiliated airports. A joint panel on circular airports is planned for the Passenger Terminal Expo in Frankfurt on 17.04.2024 (see [Table 9](#) below).

## 6.6 Airports and Terminals (Air Quality)

All four projects will consider air quality, with a specific focus on ultra-fine particles. TULIPS will create an air-quality assessment approach, including definition of an air-quality baseline and its assessment, capitalising on preceding emissions inventories and associated information on emissions sources from Schiphol airport. The project will also undertake air-quality assessments for the demonstrations at Schiphol airport, applying a combined model-based and measurement-based approach. This will be done in parallel with near real-time monitoring of both airside and landside air quality, and a better characterisation of emissions sources.

OLGA will look to increase the fidelity of measurements of ultra-fine particles while STARGATE will make air quality consequences of mobility choices at and around the airport transparent.

## 6.7 KPIs

The focus areas described above have a valid potential to become the baseline for 7-10 high-level KPIs to measure the progress of reducing the environmental impact (emissions) from airport operations in the EU. CINEA has announced a joined workshop event planned for December 2024 with the objective of creating harmonised high-level KPIs for this purpose. This effort will enable the Commission to comment on the cluster's overall impact and to define general metrics to monitor the progress towards its aviation related decarbonisation targets (also see [Table 5](#) below). This work needs to consider the different metrics which are envisioned by the projects to measure their individual impact on the implementation of the EU Green Deal in the aviation sector (also refer to non-technical synergies in [Appendix C](#)). The KPIs for the cluster could be linked to the single focus areas as shown in the example for energy savings in [Table 5](#) below.



Table 5 Project related baselines for KPIs on Energy savings

Project	Actions / Metrics being considered
TULIPS	<ul style="list-style-type: none"> <li>Interim and final assessments of the energy consumption for each demonstrator, quantified with reference to appropriate baselines and benchmarks, and with clearly stated assumptions.</li> </ul>
OLGA	<ul style="list-style-type: none"> <li>Measurement of energy savings from the start to the end.</li> <li>Reduce electricity consumption in aircraft stand lighting by 60%, based on feasibility demonstrated with on-site implementation.</li> </ul>
STARGATE	<ul style="list-style-type: none"> <li>Airport building energy optimised by cutting at least 50% of additional energy demand and emissions caused by operational issues.</li> <li>0.5MWp production by solar panels owned by local communities.</li> </ul>

It could also be done at a combined level as shown in the example for Green House Gas Emissions which combines airside operations (hydrogen) and SAF in one set of metrics. (see Table 6 below.

Table 6 Project related baselines for KPIs on GHG Emissions

Project	Actions / Metrics being considered
TULIPS	<ul style="list-style-type: none"> <li>Interim and final assessments of GHG emissions (disaggregated into scope 1, scope 2, and scope 3) for each demonstrator, quantified with reference to appropriate baselines &amp; benchmarks, and with clearly stated assumptions.</li> </ul>
OLGA	<ul style="list-style-type: none"> <li>Demonstration of 'net zero' CO<sub>2</sub> turnaround with APU reduction, low carbon taxiing and GSE, and SAF.</li> </ul>
STARGATE	<ul style="list-style-type: none"> <li>GHG emissions optimised by cutting at least 50% of additional energy demand and emissions caused by operational issues.</li> <li>Reduction of GHG emissions - of airport operation of 40% (scope 1 and 2 emissions) and 20% (scope 3 emissions) during the project duration, even when adjusting for traffic effects from COVID-19, and of 50% (scope 1&amp;2) and 25% (scope 3 emissions) by 2030.</li> </ul>



## 7 Joint clustering activities

To maximise the impact of the EU GD, Call on Green Airports, TULIPS, OLGA, and STARGATE have collaborated on the development of several joint communication and dissemination activities that showcased our synergies and complementarity. The ALIGHT Project was included in the discussions more recently to extend the clustering activities beyond the EU Green Deal within the functional community of EU Research on sustainable airport operations or “Green Airport Projects”.

### 7.1 Events

Two types of events were organised between the green airport projects:

Type	Description
<b>Internal Events</b> (e.g. Coordination Meetings, Workshops, Web Meetings)	Meetings between the project coordinators and other members of the Project Management Committees, as required (e.g. WP Leads)
	Meetings to discuss and prepare future joint actions.
	Project Management Meetings to be up to date with the progress made on synergies.
<b>External Public Events</b> (e.g. Panels, Conferences, Workshops, Presentations)	Events that are committed to harmonise the implementation of the EU GD objectives and the expected outcomes, with focus on collective efforts to reach the climate targets, see table 5 below.

So far, the following events were attended and are planned to be attended by the cluster:

*Table 7 List of Internal Cluster Events*

Date and Event	Partners	Output
<b>14.04.2022</b>		
Online meeting between project coordinators, project management officers, communication and dissemination managers to kick off collaboration	TULIPS, OLGA, STARGATE	Understanding of the role of clustering at the management level. Definitions of general ambitions in line with the overall objectives on the call on innovations for green airports and ports.
<b>05.05.2022</b>		
Side meeting at the ReFuel EU Aviation Conference in Brussels to discuss the cross-fertilization report	TULIPS, OLGA, STARGATE	Early understanding of how the cluster project could coordinate efforts in promoting the acceleration of SAF uptake and SAF infrastructure from airports.
<b>09.06.2022</b>		
Online meeting to discuss the draft structure of the clustering report and to prepare for PTE.	TULIPS, OLGA, STARGATE	Agreed structure of Cluster Report and joined concept for the PTE (Passenger Terminal Expo) 2022.
<b>21.06.2022</b>		
Online meeting on the clustering report, second draft	TULIPS, OLGA, STARGATE	Approval and feedback from the related partners



<b>28.06.2022</b>		
Online meeting on the clustering report, final version	TULIPS, OLGA, STARGATE	Approval from related partners
<b>12.12.2022</b>		
Internal event with TULIPS partners on SAF hosted by Avinor at Oslo Airport	TULIPS and leading EU airports	WP5.5 dissemination of SAF-incentives and policies with EU airports. including (Swedavia, CPH, ADP, BRU, etc.) and int. bodies such as DG CLIMA and RSB
<b>31.01. 2023</b>		
Stargate Sustainable (Air)Ports event Brussels	TULIPS, OLGA, STARGATE, MAGPIE, PIONEERS	Intensive working session exploring the opportunities for close collaboration across project boundaries. Deep dive into each projects targets. demonstration areas and clustering opportunities
<b>29.08.2023</b>		
Online Meeting between TULIPS (Torino) and OLGA (ADP) on smart grits at airports	TULIPS, OLGA,	Better understanding of synergies within the ambitions and achievements in the field of smart grits at airports. Follow up meeting in planning
<b>29.09. 2023</b>		
Online Meeting with STARGATE on joint Methods of KPI tracking	TULIPS, STARGATE	Understanding of joint initiative to measure impact of the projects as recommended by CINEA during the M18 review. Set of KPIs from STARGATE was requested for review by TLIPS
<b>13.11.2023</b>		
Side meeting at the eMAGO Kick-off in Brussels involving TULIPS OLGA and CINEA/ TEN-T representatives	TULIPS, OLGA	Early understanding how the projects from the Cluster could engage in defining the role of airports in greening the increasing sustainability in the Trans-European Transport Network (TEN-T). Opportunities to reflect on the whole cycle of hydrogen use in airport operations from production to hydrogen powered GSE.
<b>30.11.2023</b>		
Side meeting ARC Event on Green Airports & Green Aviation	TULIPS, ALIGHT	Discussing options to collaborate in the field of non-CO <sub>2</sub> emissions
<b>04.12.2023</b>		
Online meeting to coordinate the future clustering activities and further define cooperation themes	TULIPS, OLGA, STARGATE ALIGHT	Sharing insights on C&D activities, strategies and best practices.
<b>06.12.2023</b>		
Participation in the OLGA event on transport landside access with multimodal solutions	OLGA TULIPS	The event was public, TULIPS took the opportunity to discuss joint objectives and collaboration actions within an airports' mobility needs.
<b>20.12.2023</b>		
Online Meeting between stakeholders of TULIPS WP1 and OLGA WP2 - Follow up from the OLGA event on transport landside access with multimodal solutions	OLGA TULIPS	Twenty-five members from the TULIPS and OLGA projects discussed the synergies and potential future collaboration on contribution towards the Sustainable and Smart Mobility Strategy /



		EU Green Deal within TULIPS WP1 and OLGA WP2.
<b>22.01.2024</b>		
Working Group Circular Airports - Kickoff	TULIPS, OLGA, STARGATE ALIGHT	Formation of a permanent working groups. Discussion on joined objectives and potential synergies on the subject of circular airport development.
<b>31.01.2024</b>		
Coordination Meeting SAF production and infrastructure.	TULIPS, STARGATE	WP Leads from TULIPS and Stargate met to discuss synergies. • Follow-up Meeting planned at between TULIPS, OLGA, Stargate and ALIGHT at the SkyNRG office around the SAF Congress 21 - 23 May 2024 in Amsterdam.

Table 8 List of Public Cluster Events

Date and Event	Partners	Output
<b>05.05.2022</b>		
Panel discussion with OLGA, Stargate, TULIPS and ALIGHT at the ReFuelEU Aviation Conference in Brussels (airports-industry-and-regions)	TULIPS, OLGA, STARGATE ALIGHT	Positioning the different EU funded projects under the umbrella of the ReFuelEU initiative and the challenges /needs of airports in accelerating the uptake of SAF in the market.
<b>15.06.2022</b>		
Panel discussion with OLGA, Stargate and TULIPS at Passenger Terminal Expo (PTE) 2022 in Paris	TULIPS, OLGA, STARGATE	
<b>16.03.2023</b>		
<b>Passenger Terminal Expo (PTE) 2023 Amsterdam</b>	TULIPS, OLGA, STARGATE, ALIGHT	Presentation of each project and focus at SAF and air quality solutions
<b>22.06.2023</b>		
Paris Air Show 2023	TULIPS, OLGA, STARGATE,	Presentation of each project and various solutions, moderated by CINEA. Extensive online media coverage of the event.
<b>21-23. 05. 2023</b>		
Sustainable Aviation Futures Congress 2023 in Amsterdam	TULIPS, OLGA, STARGATE, ALIGHT	Presentation of each project and various solutions with focus at SAF.
<b>05.07.2023</b>		
EASN Conference Salerno	TULIPS, OLGA, STARGATE ALIGHT	TULIPS presented its progress on: Demo activities for the greening of airports: alongside the other cluster projects and ALIGHT from the SMART Airports call in the track for <i>Local Air Quality, Noise, Green Airports</i> The track was led by CINEA. Its impact is likely to have end-user and policy relevance.
<b>26.10.2023</b>		
Aviation Sustainability Festival in The Hague (NACO)	TULIPS, OLGA,	Intro, brainstorm and deep dive workshops on various themes: air quality,



	STARGATE, ALIGHT	circularity principles, SAF and future aircraft energy
<b>28.11.2023</b>		
<b>STARGATE &amp; ACI EUROPE Hydrogen Airports Conference</b>	TULIPS, OLGA, STARGATE	Common understanding of EU Green Deal projects and their challenges on hydrogen systems at the airport

Besides the regular expected meetings at the level of each focus area there are already a few external Events during which the projects are planning to perform joint communication and dissemination (see Table 9 below). Other events may be added depending on the availability of partners and resources.

*Table 9 Potential Public Clustering Events 2024*

Date	Title
03 April 2024	Connecting Europe Days “Connecting Europe by Air” Event – Brussels
17 April 2024	Passenger Terminal Expo – Frankfurt
October 2024	TULIPS “Come and See” Event 2024 (possibly hosting the 2 <sup>nd</sup> Hydrogen Airports Conference 2024) – Torino
December 2024	CINEA event on joined performance measures – expected in Brussels

## 7.2 Publicity

Besides the ongoing coordination efforts in internal clustering events and joint dissemination events towards the public the green airports projects also utilised joint communication actions to harmonise the transition towards carbon neutral airport operations in the spirit of the European Green Deal.

### 7.2.1 Press releases

The projects have been utilising press releases both in print and digital media to report on our major achievements and to highlight each other’s progress.

Press releases distributed so far:

Date	Title
02 June 2022	<a href="#">How four EU projects are making the airports of tomorrow more sustainable.</a>
28 June 2023	EU GD Airports projects showcasing green transition at <a href="#">#ParisAirShow2023</a>

### 7.2.2 Social media

The projects have agreed to tag each other across their respective LinkedIn, Instagram, YouTube pages/profiles and we have been posting and re-posting our joint communication and dissemination activities as well as sharing events, results, achievements. So far, 11 social media posts have been shared between the projects.



### 7.2.3 Web Articles Online Posts Newsletters Videos

The different projects covered overarching events through blog posts on their website using key words like green airports or sustainable airport or more specific topics. Significant coverage was achieved for the joined event at the Paris Air Show organised by CINEA. A similar event should be staged in 2024 with the ambition to put sustainable airport operations to the forefront of the agenda of European airport managers and related policy makers.

Examples are for the media coverage of the Paris Air Show event can be found in [Appendix D](#).

### 7.2.4 Website mentions.

The three projects mutually agreed to include and mention each other on our respective website, by including abstracts about the sister projects. Out of the three projects STARGATE even took the opportunity to highlight the joint events below the abstract of the sister projects. It is yet to be clarified if ALIGHT should be mentioned on the websites, see [Appendix E](#) for reference.



## 8 Engagement with industry forums

TULIPS takes part in awareness raising activities with other EU initiatives through the forums such as those listed below:

### 8.1 Green Deal “Urban Environment and Mobility Working Group” (GD-SO UM WG)

A parallel collaboration workstream being managed by the GD-SO under the direction of the EC has also been set up. As TULIPS, OLGA, and STARGATE are part of the ‘Urban Environment and Mobility Working Group’, overlaps exist with our clustering activities. We recommend CINEA and the EC to review their objectives and coordinate with each other to ensure there is no duplication of effort. This is particularly important as none of the activities proposed by the GD-SO through the ‘Urban Environment and Mobility Working Group’ were included in the scope of our respective grant agreements.

### 8.2 Alliance for Zero-Emission Aviation (AZEA)

The Alliance for Zero-Emission Aviation (AZEA) is a voluntary initiative of private and public partners who share the objective to prepare the entry into commercial service of hydrogen-powered and electric aircraft. Multiple TULIPS partners are already members of the AZEA alliance and WG3 of the AZEA alliance, which is related to aerodromes, is of particular interest to TULIPS. We see the alliance being another piece of the aviation Fit-for-55 ecosystem, and as a larger community platform to engage and share knowledge through our common partners.



## 9 Engagement with specific initiatives/frameworks

### 9.1 European Green Deal

The clustering within the spirit of the **EU Green Deal** is intrinsic and contractually agreed for the majority of the projects identified in section 5; demonstrates the overarching paradigm shift within the EU development strategy for climate change adaptation. All projects are committed to make a meaningful contribution; further active clustering could enhance the impact of the projects. The impact from the green deal projects is generated in two stages. Firstly, they engage in translating the high-level targets for decarbonisation at continental level into tangible targets for the transportation section with reference to aviation and, here specifically, to sustainable airport operations. Secondly, they develop technical solutions, concepts and recommendations which other airports on the continent can adopt. To accelerate the uptake of the projects' output, the visibility of the green airport concept needs to be visual at all times and language used should be in parallel with the green deal. As local specifications and requirements of airports vary significantly, a wider range of solutions would increase the likelihood of fellow airports to recognise the adaptation potential for their own operations. To this end, a successful joint dissemination action was arranged during the Paris Air Show on 22<sup>nd</sup> June 2023. The cluster would benefit from similar events as the projects mature. The current budget for clustering work however is limited and thus such events would have to be organised by the Commission (as was the case for the joined panel at the Paris Air Show.).

### 9.2 Trans-European Transport Network (TEN-T).

In 2023 TULIPS took the opportunity to assess the potential contribution of the Green Airport Projects towards the implementation of the **Trans-European Transport Network (TEN-T)**. The directive was under review to increase the sustainability of transport for major European transport corridors. These corridors include several major European airports that are entrance and/or exit points for passengers and freight. Furthermore, airports add a significant level of resilience to the European Transport Network as they can bridge drawbacks in long distance supplies, as seen with the blockage of the Suez Channel or the restriction of inner EU border crossings as experienced during the COVID-19 pandemic. During the kick-off meeting of the eMago Conference on 17<sup>th</sup> November 2023 discussions with the European Commission revealed that the specific role of airports towards more sustainable transport corridors is not yet clearly defined. The four projects identified in section 5.1 would have the potential to start this exercise as they cover the major airports alongside the [North Sea -Rhine- Mediterranean-Corridor](#). The projects develop individual methods and technologies that have the potential with the joint capacity to describe how airports can be linked to the major corridors in the most sustainable manner. This way a gap would be narrowed within the paradigm of the EU Green Deal which intrinsically assumes that EU member



states will provide a carbon neutral solution for the transport of goods and within the EU by 2050. At the current level of funding, clustering activities would enable the technical solutions, concepts and recommendations to be consistent with this paradigm. Active collaboration would require a clearer governance structure and additional funding among projects.

### 9.3 Smart and Sustainable Mobility Strategy

Although the **Smart and Sustainable Mobility Strategy** (SSMS) is not directly linked to airport operations it remains very relevant as airports function as both sinks and sources for the transport/mobility need of passengers and freight. There are mobility streams which are directly attributable to the existence of airports in the EU for why airports remain responsible to support the implementation of the SSMS as part of the European transport network. In this context, the SSMS is also interlinked with the Green Deal and the TEN-T Network, as discussed in the previous two sections. Within the Green Airports Cluster, TULIPS and OLGA are directly addressing sustainability issues for mobility at airports. A working group was formed, and regular meetings are likely. The group may be equipped to jointly present their contributions at EU conferences like the Connecting Europe Days or similar. However, budget constraints require involvement of third parties to organise the event.

### 9.4 ReFuelEU

The main objective of the **ReFuelEU** initiative is to increase both demand for, and supply of, sustainable aviation fuels (SAF), which have lower CO<sub>2</sub> emissions than fossil fuel kerosene, while ensuring a level playing field across the EU air transport market. As indicated in section 6.1, SAF is amongst the most prominent priorities set across all projects in the green airport cluster. The joint effort of the projects could provide a holistic picture that helps make the subject more tangible from an airport point of view. The project needs to be jointly invited to related conferences to present their findings and motivate airports to consider the concepts and findings from the projects for their adaptive strategies. The projects have already joined forces during key conferences in 2023 but a continuous presence will be required to facilitate airports to plan and implement their SAF supply as early as possible. Active support from the Commission to integrate the four projects into ReFuelEU Events would be beneficial to the clustering activities. TULIPS actively cooperated with the dissemination through a broad airport SAF platform with ALIGHT, currently facilitated by RSB.

### 9.5 Fit for 55

The **Fit for 55** packages is also an essential component of the EU Green Deal. It is targeting the revision of EU policies and legislation to ensure the reduction of net greenhouse gas emissions by at least 55% by 2030. Next to the increase of SAF (ReFuelEU is one of the initiatives under the Fit for 55 Package), the use of Hydrogen as an alternative fuel for airplanes or ground handling



equipment is of major interest to airports to reduce scope 1 and 2 Emissions until 2030. As described in [section 6.2](#) the three Green Deal Projects are covering different aspects for the integration of hydrogen in airport operations. Furthermore, conferences in 2023 revealed that the subject is already widely discussed beyond these projects. Positive feedback came from the first Hydrogen Airports Conference hosted by STARGATE & ACI EUROPE at Brussels Airport on 28<sup>th</sup> November 2023. The public event was attended by TULIPS, OLGA and STARGATE with the ambition to generate a common understanding of EU green deal projects and the challenges relating to hydrogen systems at the airport. The format should be continued annually make sure that the joint output from the projects can help airports to get a clear understanding on how hydrogen can help to reduce greenhouse gas emissions from their operations by 2030. TULIPS is envisaging to organise a follow-up conference in Torino in October 2024. The event should be supported through the participation of representatives from the Commission to ensure that suggested outputs are considered for the uptake in EU Green Deal policies.

## 9.6 Circular Economy Action Plan

The European Commission adopted the **new circular economy action plan (CEAP)** as one of the main building blocks of the European Green Deal. “The EU’s transition to a circular economy will reduce pressure on natural resources and will create sustainable growth and jobs.” While the reduction of pollution within the transport sector is traditionally seen as the reduction of emissions, sustainable waste management receives significantly less attention. Airports kept a strong focus on hygiene, safety and customer satisfaction to guarantee ease of travel for all types of international passengers. Within this, resulting in waste becoming an accepted by-product. This paradigm however can no longer be sustained where a growing aviation sector and an overall decreasing availability of natural resources are becoming unsustainably contradicting trends.

Unlike cities and regions, airports can be seen comparably closed systems in which the implementation of a circular approach can be implemented in a shorter time span. This success of its implementation, however, will strongly depend on the innovation that will make circularity work for airport operators. Beyond the related concepts and technologies that can be used towards transitioning to circular airports, it will be important to make sustainable products the norm in the EU. In this context, TULIPS has already integrated the first results in the JRC/ CEN-CENELEC “putting science into standards” workshop on CEN/TC 350/SC 1 - Circular Economy in the Construction Sector. As a minimum, STARGATE and TULIPS could collaborate to support the overall ambition to develop different EU norms for circular products within airport operations. A meeting is planned for the end of 22<sup>nd</sup> January 2024 to coordinate the projects’ efforts in this regard. At this stage, however, the budget provided for clustering is unlikely to produce outcomes beyond the exchange of lessons learned and initial recommendations on how to proceed towards circularity in the sector.



## 10 Conclusions

During the past year, continuous clustering activities were executed with the ambition to increase the collaboration and coordination of efforts for joint contributions towards the overarching objectives of the European Green Deal and its affiliated initiatives. Relevant projects and initiatives were defined with the core clustering activities being limited to the Green Airports Projects including TULIPS (GA 101036996), OLGA, (GA 101036871), STARGATE (GA 101037053) and ALIGHT (GA 957824).

An analysis was performed to identify the synergies between the four projects resulting in six main categories (focus areas) as a baseline for coordination and cooperation between the projects. Along those categories, working groups have been formed for Intermodal Transport and Circular Airports while a Working group for SAF and Airside operations are in concrete planning. Within these groups joint events were successfully implemented.

The clustering opportunities by categories were linked to the relevant EU initiatives and targets but the extent to which the related clustering potential will be leveraged remains unclear as the budget for clustering is limited and governance structures remain unclear. To fully exploit the potential identified additional resources need to be mobilised.

The previous period has shown that external facilitation can help as seen in the joint dissemination event at the Paris Air Show but also that individual projects can take the opportunity to organise events like the Hydrogen Airports conference at Brussels Airport organised by STARGATE.

In the coming period the projects will continue to exchange information and perform joined clustering activities, were useful. With a structured baseline at hand, they will be able to serve the contractual obligations on clustering activities. Additional potential could already be exploited through external facilitation through framework events organised by the Commission. A higher impact would thus be generated through an organised approach with designated resources and structure to the clustering task.

Large scale joined dissemination events are planned for the Connecting Europe days in April 2024. Moreover, topic related work packages are likely to increase their joined dissemination efforts at topic-related conferences in 2024. A major opportunity to support focus area 2 'Airside Operations' lives within the continuation of the Hydrogen at Airports Conference which TULIPS is currently assessing for October 2024.

The projects are expecting a workshop organised by CINEA/DG MOVE which will aim to develop common indicators for the progress of airports contributions towards reaching the EU Green Deal targets. The analysis of synergies may be used as a baseline for this exercise. Additional detail on the event planned for December 2024, however, is yet awaited.



## Appendix A: PULSAR LONGLIST OF PROJECTS

The longlist of projects that were considered for clustering was taken from the [PULSAR](#) Project (GA 101095395) that strives to shape some research roadmap for environmental aviation.

Project	GA Number	Category
Impact Monitor	GA 101097011	Monitoring Action
ACACIA	GA 875036	Climate Impact & Operations
ClimOP	GA 875503	Climate Impact & Operations
BeCoM	GA 101056885	Climate Impact & Operations
AVIATOR	GA 81 4801	Local Air Quality
NEEDED	GA 101095754	Local Air Quality
ANIMA	GA 7696271	Noise
ARTEM	GA 769350	Noise
Pandora	GA 101096156	Noise
ENABLE H2	GA 769241	Hydrogen
HESTIA	GA 101056865	Hydrogen
EFACA	GA 101056866	Hydrogen
JETSCREEN	GA 7235251	Sustainable Aviation Fuel
TAKE-OFF	GA 1010067991	Sustainable Aviation Fuel
EASIER	GA 875504	Electric Propulsion
HELENA	GA 101069681	Electric Propulsion
MATISSE	GA 101056674	Electric Propulsion
IMOTHEP	GA 875006	Hybrid Propulsion
MAHEPA	GA 723368	Hybrid Propulsion
ALIGHT	GA 957824	Airports
OLGA	GA 101036871	Airports
STARGATE	GA 101037053	Airports
TULIPS	GA 101036996	Airports

Although the primary focus will be on the “airport” projects in the PULSAR Network other projects may be considered. PULSAR representatives may be invited to cluster meetings.



## Appendix B: LINK FOCUS AREA TO THE GREEN AIRPORTS AND PORTS AS MULTIMODAL HUBS FOR SUSTAINABLE AND SMART MOBILITY CALL

From the [call text](#):

### Area A: Green Airports

Actions should perform large-scale, real-life high TRL (6 or above) demonstrations of green airports, addressing all of the following four headings, collectively describing the various airport aspects to be considered: 1) Transport, 2) Terminal, 3) Energy and 4) Cross-cutting aspects.

Heading	Green Airports Clustering Focus areas
Transport	Intermodal Transport / Multi Modal Connections
	Airside Operations (Hydrogen)
Terminal	Circularity
	(Smart) Energy
Energy	SAF (Production, supply chain and infra structure)
	Energy (Hydrogen)
Cross-cutting aspects.	Airports and Terminals (Air Quality, Noise)

The selection of focus area was based on the technologies and concepts with which the Projects TULIPS, OLOGA and Stargate responded to the call and for which they were funded. The ALIGHT project principally responded to a different call, but the concepts and technologies developed through the project are directly transferable to the actions required from the call on green airports and ports as multimodal hubs for sustainable and smart mobility.

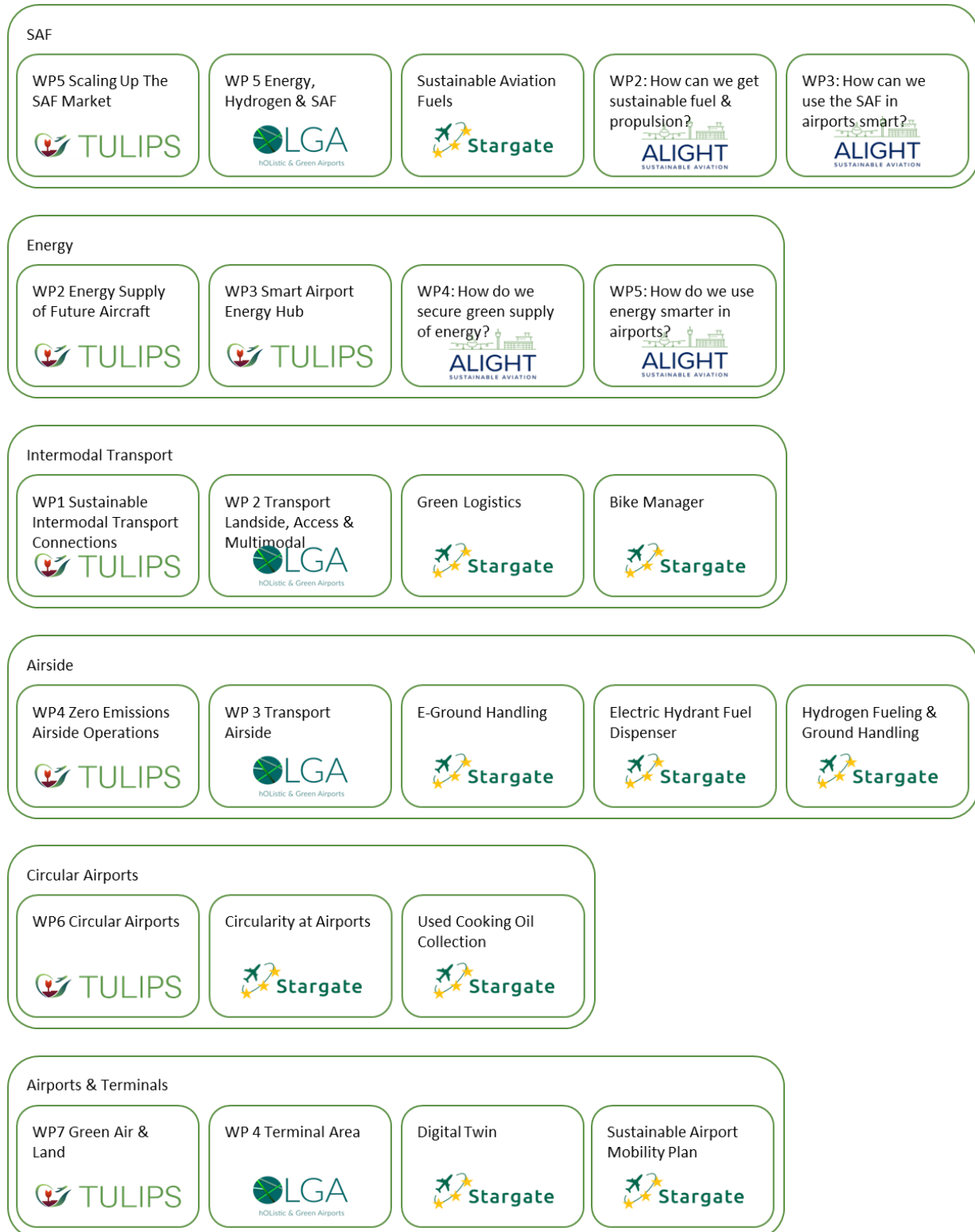
Based on the actions offered from the projects a more granular approach was possible, which led to a different grouping. The table above illustrates the connection between the two categories. The Focus areas will be the foundation for subject specific working groups that cut across the individual projects in the cluster.

The performance and joined output from these working groups will be limited by the resources made available.



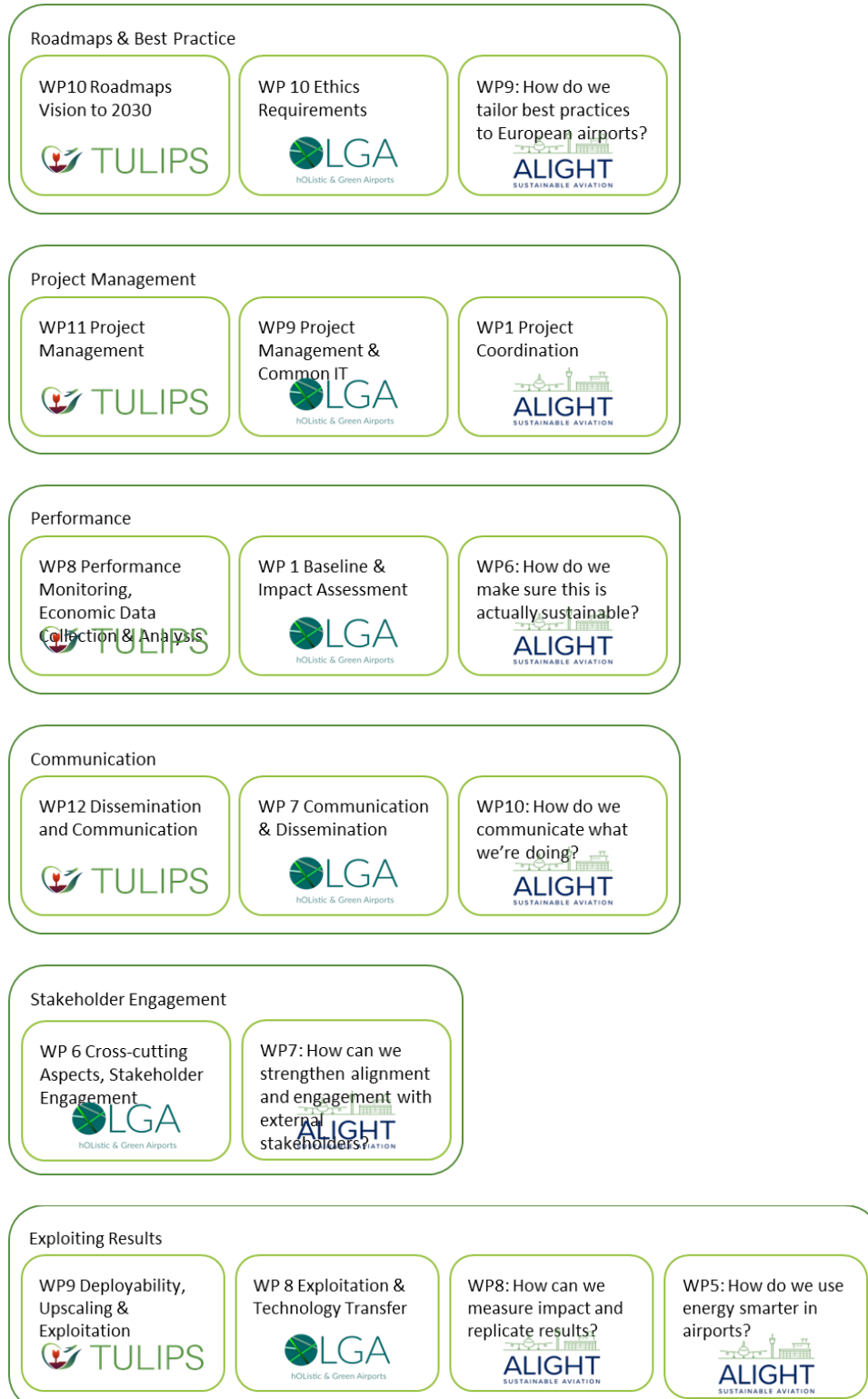
## Appendix C: SPECIFIED SYNERGIES

### Technical Synergies:





## Non-Technical Synergies.





## Appendix D: **MEDIA COVERAGE OF THE PARIS AIRSHOW EVENT**

[https://cinea.ec.europa.eu/news-events/news/eu-green-deal-airports-projects-showcasing-green-transition-parisairshow2023-2023-06-28\\_en](https://cinea.ec.europa.eu/news-events/news/eu-green-deal-airports-projects-showcasing-green-transition-parisairshow2023-2023-06-28_en)

<https://www.olga-project.eu/post/olga-stargate-tulips-together-at-the-paris-air-show-to-accelerate-transition-to-green-airports>

<https://www.greendealstargate.eu/news/sister-projects-organise-panel-discussion-at-paris-air-show/>

<https://tulips-greenairports.eu/green-airports-side-event-at-paris-air-show-2023/>

[https://www.linkedin.com/posts/tulips-green-airports\\_olga-stargate-tulips-together-at-the-paris-activity-7105463874455265280-IP6e/](https://www.linkedin.com/posts/tulips-green-airports_olga-stargate-tulips-together-at-the-paris-activity-7105463874455265280-IP6e/)

<https://www.ttf.ruhr-uni-bochum.de/ttf/aktuelles.html.en>

[https://www.linkedin.com/posts/tulips-green-airports\\_did-you-enjoy-the-paris-air-show-back-activity-7102267216644960256-aBG5/](https://www.linkedin.com/posts/tulips-green-airports_did-you-enjoy-the-paris-air-show-back-activity-7102267216644960256-aBG5/)

### Video

<https://www.youtube.com/watch?v=Dybaxr--PTQ>



## Appendix E: WEBSITE MENTIONS



[Home](#) [About](#) [Projects](#) [Related projects](#) [Partners](#) [News](#) [Launch Event](#) [Contact](#)

### Related projects

▼ Related projects

Together with these EU projects we aim to accelerate the environmental transition of operations at airports. Meet Stargate, OLGA and ALIGHT.

### TULIPS sister projects



Stargate – Sustainable Airports, the Green heART of Europe, is a sister project of TULIPS. Stargate is an ambitious project selected by the European Commission to prove that a more sustainable aviation is possible. Together with a diverse consortium of 21 partners, Brussels Airport takes the lead in the development, testing and deployment of innovative solutions to create the green airports and aviation of the future.

[Read more](#)



OLGA (hOlistic Green Airport) is a sister project of TULIPS. OLGA is a H2020 project funded under the European Green Deal, which aims to reduce the environmental impact of the aviation sector. The project, which started on 1<sup>st</sup> October 2021, is coordinated by Groupe ADP, with Paris Charles de Gaulle Airport as a frontrunner.

[Read more](#)

### Other TULIPS related projects



ALIGHT – A Lighthouse for the introduction of sustainable aviation solutions for the future, is a smart airport project funded by the European Union's Horizon 2020 research and innovation programme, which will address the global need to reduce greenhouse gas (GHG) and other air emissions in order to adapt to climate change and promote a sustainable future.

[Read more](#)

### More interesting projects

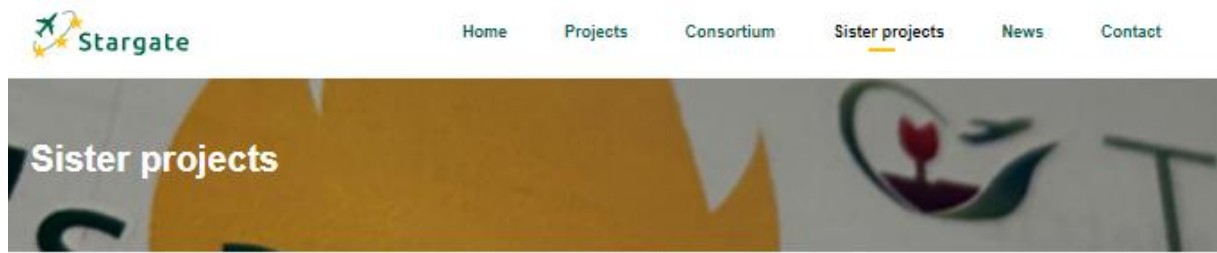
These projects you might also find interesting.

Sustainable ports sister projects funded under the same call:

- **Maggie** is led by the Port of Rotterdam
- **PIONEERS** is coordinated by Port of Antwerp-Bruges

Towards quieter aviation: for an overview of projects that develop, test and exploit innovative solutions towards quieter and more sustainable aviation, visit the website of CINEA.

Visit the website of the European Union for an overview of all Green Deal projects.



## Joining forces with sister EU Green Deal projects

The cooperation that characterises Stargate is also present across the various EU Green Deal projects for greener airports. On a regular basis, Stargate, TULIPS and OLGA work together to spread and realise their green ambitions. As it happens, both the consortia's similarities and differences result in fruitful complementarity.



### TULIPS

**TULIPS** stands for Demonstrating lower polluting solutions for sustainable airPorts across Europe. This EU Green Deal project started in January 2022 and will last until December 2025. The TULIPS project focuses on developing innovations that facilitate the transition to low-carbon mobility and enhance sustainability at and around the airports. Under the leadership of Royal Schiphol Group, TULIPS aims to speed up and roll out sustainable technologies in aviation and significantly towards zero emissions and zero waste airports by 2030 and climate neutrality by 2050.

[Read more](#)



### OLGA

**OLGA** (hOListic Green Airport) project started on 1<sup>st</sup> October 2021 and was funded under the European Green Deal, which aims to reduce the environmental impact of the aviation sector. The OLGA project is coordinated by Group ADP, with Paris Charles de Gaulle Airport as a frontrunner. OLGA carries out major environmental innovations at airports and focuses on reducing the environmental footprint from passengers, airlines and neighbourhood perspectives.

[Read more](#)

## Joint events





## Sister projects

**Stargate** is an ambitious project selected by the European Commission to prove that a more sustainable aviation is possible. The programme includes over 30 specific projects focusing on three objectives: enhancing decarbonisation, improving local living quality, and stimulating the modal shift.

[Read more](#)

**TULIPS** will accelerate the implementation of innovative and sustainable technologies toward lower emissions at airports. 17 real-life demonstrations of green airport innovations (technological, non-technological, and social) will be performed at the Lighthouse Schiphol, and some also at fellow Oslo, Turin, and Larnaca airports.

[Read more](#)



OLGA project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 101036871.

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