



Demonstrating lower polluting solutions for sustainable airports across Europe

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**Specify existing roadmap lighthouse with solutions
from demo area's towards outlook 2030**

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I. DELIVERABLE INFORMATION

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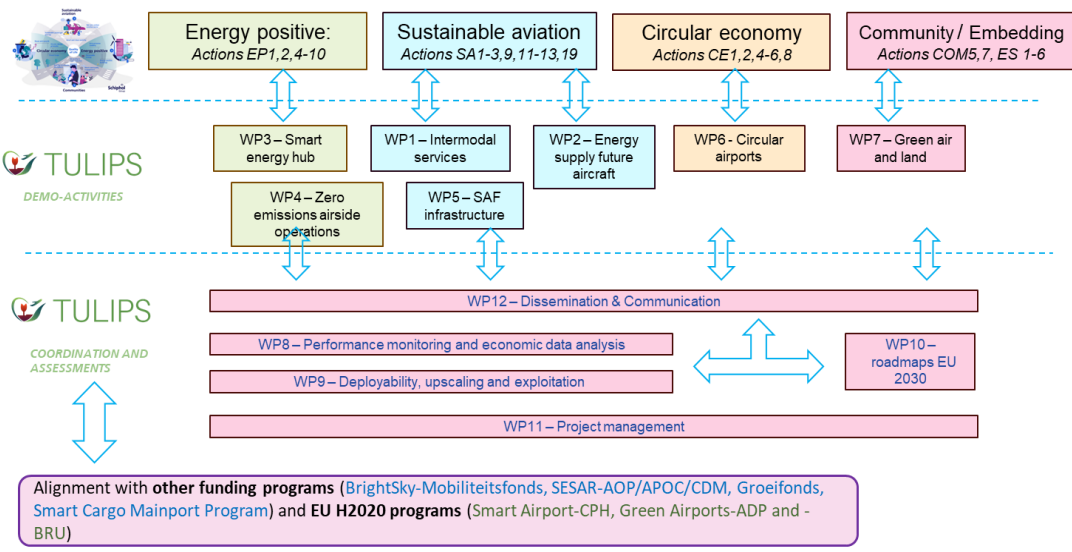
Abstract

Disclosure Statement:

Public:

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II. PROOF OF DELIVERY

<p>Description of Deliverable:</p>	<p>Specify existing roadmap lighthouse with solutions from demo area's towards outlook 2030</p>														
<p>Introduction:</p>	<p>Lighthouse Airport Royal Schiphol Group (RSG) aims to operate the most sustainable airports in the world. In doing so, RSG focuses on four themes: circular economy, energy positive, sustainable aviation and communities. Each theme has a concrete goal, see Annex A.</p> <p>The RSG 2030 goals are as follows:</p> <ul style="list-style-type: none"> • Zero emissions and zero waste in our operations, CO2 emissions from aviation are reduced to 2005 levels. • RSG has improved the balance between our airports and the local communities. <p>TULIPS will support and advance these targets by performing various innovation projects aimed at demonstrating sustainability.</p> <p>Images 1 and 2 show the relation between the RSG roadmap and the TULIPS demonstrators.</p>														
<p>Proof of delivery</p>	<p>- Image 1: Overview Themes and linked work packages from TULIPS</p>  <p>- Image II: Overview of demonstrators and result areas from TULIPS</p> <table border="1"> <thead> <tr> <th>WP1: Intermodal services</th> <th>WP2: Energy supply future aircraft</th> <th>WP3: Smart energy hub</th> <th>WP4: Zero emissions airside operations</th> <th>WP5: SAF infrastructure</th> <th>WP6: Circular airports</th> <th>WP7: Green air & land</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Single source data & distributing information to services Increase use of: <ul style="list-style-type: none"> electric freight transport public transport + shift to green commuting modes digital solutions for international green travel </td> <td> <ul style="list-style-type: none"> Feasibility study incl. energy demand forecast (link with WP3) Demonstrate: <ul style="list-style-type: none"> Unattended charging Modular charging system Airport-facilitated hydrogen flight </td> <td> <ul style="list-style-type: none"> Implementing <ul style="list-style-type: none"> Improved Airside electricity traffic incl storage and direct PV charging Fully integrated heat storage systems into existing hotel infrastructure </td> <td> <ul style="list-style-type: none"> Development & operation of: <ul style="list-style-type: none"> H2 GPU with a hydrogen fuel cell (H-GPU) Large size H2 tow tractor (able to move A380, B777 aircraft) which uses hydrogen powered fuel cells </td> <td> <ul style="list-style-type: none"> Scale-up of SAF market Set up EU Clearing house Enable airports to support the scale-up of SAF supply Demonstrate: <ul style="list-style-type: none"> Large scale SAF supply Incentives for airports to increase SAF usage </td> <td> <ul style="list-style-type: none"> Set up circular baseline for airport and circularity management system Demonstrate: <ul style="list-style-type: none"> Application of circular building tooling Elimination of operational consumer/ passenger waste </td> <td> <ul style="list-style-type: none"> Focus at cross-cutting aspects through: <ul style="list-style-type: none"> Airside UFP mitigation measures and monitoring Airport land carbon sequestration with biochar, including nature based solutions </td> </tr> </tbody> </table>	WP1: Intermodal services	WP2: Energy supply future aircraft	WP3: Smart energy hub	WP4: Zero emissions airside operations	WP5: SAF infrastructure	WP6: Circular airports	WP7: Green air & land	<ul style="list-style-type: none"> Single source data & distributing information to services Increase use of: <ul style="list-style-type: none"> electric freight transport public transport + shift to green commuting modes digital solutions for international green travel 	<ul style="list-style-type: none"> Feasibility study incl. energy demand forecast (link with WP3) Demonstrate: <ul style="list-style-type: none"> Unattended charging Modular charging system Airport-facilitated hydrogen flight 	<ul style="list-style-type: none"> Implementing <ul style="list-style-type: none"> Improved Airside electricity traffic incl storage and direct PV charging Fully integrated heat storage systems into existing hotel infrastructure 	<ul style="list-style-type: none"> Development & operation of: <ul style="list-style-type: none"> H2 GPU with a hydrogen fuel cell (H-GPU) Large size H2 tow tractor (able to move A380, B777 aircraft) which uses hydrogen powered fuel cells 	<ul style="list-style-type: none"> Scale-up of SAF market Set up EU Clearing house Enable airports to support the scale-up of SAF supply Demonstrate: <ul style="list-style-type: none"> Large scale SAF supply Incentives for airports to increase SAF usage 	<ul style="list-style-type: none"> Set up circular baseline for airport and circularity management system Demonstrate: <ul style="list-style-type: none"> Application of circular building tooling Elimination of operational consumer/ passenger waste 	<ul style="list-style-type: none"> Focus at cross-cutting aspects through: <ul style="list-style-type: none"> Airside UFP mitigation measures and monitoring Airport land carbon sequestration with biochar, including nature based solutions
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<p>Current progress:</p>	<p>From the start of developing TULIPS the RSG roadmap has been used to design the targets and demo's under TULIPS work packages. The yearly update and specification of each theme is listed in the annex. During Kick off meeting (26 January 2022) and WP strategy session (22 June 2022) the RSG roadmap is presented and discussed with WP8, WP9 and WP10 partners in the TULIPS consortium;</p> <p>The TULIPS working packages are added to the RSG Roadmap Most Sustainable Airports, based on the information in the application. The information per work package will become more concrete over time, and will be included in the RSG roadmap during the yearly update (each year in June). The Working Packages are included in the reporting process to keep the connection with the roadmap actions and to track progress on the working packages.</p>
<p>Future actions</p>	<p>Between end of next year to the end of 2023 the following actions will be developed:</p> <ul style="list-style-type: none"> - Joint action with WP 8, 9 and 10 to interview all demos. Next step will be to develop an evaluation model per type of deliverables. - The designed demo projects will be specified in the roadmap including technical and feasible solutions (in alignment with WP8 and 9); - An economic impact analysis on this roadmap, including societal value (new jobs, value of time, traffic jams etc.) will be executed, based on economic and political scenarios towards aviation in 2030 (in alignment with WP8 and 9);

Annex A: Overview targets sustainability roadmap RSG, for setting up targets TULIPS

Roadmap Most Sustainable Airports

2030 milestones serve as a basis for the consortium vision

Energy positive target: zero emission 2030

- **Zero emissions mobility** – ground handling vehicles and own fleet
- **Energy positive buildings** – phasing out natural gas and increasing energy efficiency
- **Renewable energy** – 21 MWp locally generated supported by an effective electricity grid

Sustainable aviation target: Reduction of CO₂ emissions to 2005 level

- **Net-zero-carbon aviation sector** – Achieve 14% SAF in the Netherlands and optimize airside procedures
- **Smart and clean mobility** – Stimulate and incentivize efficient and clean landside mobility
- **Sustainable passenger journey** – RSG sustainability performance is reflected in customer experience

Circular economy target: zero waste 2030

- **Refuse and upcycle** – minimize, separate and upcycle
- **Circular design** – embed circular design principles to design for reuse of materials
- **Closed loops** – reutilization of materials in high-quality 'next life' applications

Communities target: Improved balance between communities and airports in 2030

- **Air quality and noise reduction** – Improve living areas by lowering environmental impact and Maintain constructive dialogue to ensure well-being and support of our neighbours
- **Healthy and inclusive workplaces** – Empower our strongest asset: inclusive, diverse and motivated workforce
- **Climate adaptation and biodiversity** – Create resilient airports and improve biodiversity



Annex B: latest update on the RSG roadmap and reaching the airports' Sustainability

Goals:

- Sustaining your world: Vision and strategy towards the most sustainable airports