Disclaimer: This document does not present a draft of the Green Deal call to be part of the Horizon 2020 work programme update, nor any future position of the European Commission. It aims to support the development of the call and its content is subject to change.

Title: Green airports and ports as hubs for sustainable and smart mobility

Specific Challenge: A clear commitment of the European Green Deal is that "transport should become drastically less polluting", highlighting in particular the urgent need to reduce greenhouse gas emissions (GHG) in aviation and waterborne transport. In aviation, traffic volumes are expected to double by 2050 and the sector is already generating 15% of the global GHG emissions from transport. At the same time, waterborne transport is accounting for approximately 90% of global trade and 2.5% of global GHG emissions, while also experiencing continuous growth. In this context, airports, maritime and inland ports play a major role, both as inter-connection points in the respective transport networks, but also as major multimodal nodes and commercial sites, linking with other transport modes, hinterland connections and integrated with cities. As such, green airports and ports, as hubs for sustainable and smart mobility have a great potential to immediately drive the transition to GHG neutral aviation, shipping and wider multimodal mobility already by 2025. This topic addresses innovative concepts and solutions for airports and ports communities, in order to urgently reduce transport GHG emissions and improve their resilience to climate change.

Scope: Building on best practices, ongoing projects and planned initiatives in European airports and ports, proposals should address the activities <u>EITHER</u> under area A) Green Airports <u>OR</u> under area B) Green Ports. Proposals should clearly indicate which area they are covering.

<u>Area A: Green Airports</u>

Perform large-scale, real-life high TRL demonstrations of green airports, addressing <u>all</u> of the following aspects, in the context of the following airport dimensions:

<u>1. Transport</u>

- a) From city to the airport (access and multimodal connections)
- b) From the airport to the aircraft (airside)
- c) At the airport landside (logistics, ground handlings and operations, as well as green energy production of sustainable alternative fuels or electricity)
- Demonstrate low-emission energy use (electrification or sustainable alternative fuels) for aircrafts, airports, other / connected and automated vehicles operating at airports (e.g. road

vehicles, drones), as well as for public transport and carpooling, with re-charging/re-fuelling stations and use of incentives;

- Showcase the use of innovative green de-icing and anti-icing procedures and infrastructures;
- Apply innovative digital solutions, including new tools and traffic optimisation mechanisms for multimodal access, passenger and freight flows into / out of airports, facilitating access and reducing traffic from / to the city;
- Promote infrastructure solutions for small and medium airports, scalable to large airports, to allow a critical mass of airports to deploy sustainable alternative fuels – addressing also distribution, fuel handling logistics and blending operations;
- Promote the development of sustainable alternative fuels production facilities on-site (or close to) the airport, to facilitate the conversion of airport waste to sustainable alternative fuels and the delivery of the fuels to the airport (e.g. by pipeline);
- Develop and implement a new EU Clearing House for Sustainable Kerosene (EU-CHSK), to undertake testing for new value chains of renewable kerosene in Europe. The EU-CHSK should select laboratories for the actual analyses of the fuels, as well as facilities that can carry out the actual testing in jet engines, in compliance with either existing or newly developed ASTM standards

2. Terminal

- Demonstrate integration of new solutions with operations, green and smart logistics and infrastructures;
- Develop the green built environment (construction/demolition) and procurement processes;
- Improve the energy efficiency of buildings; optimise services such as lighting, heating, ventilation, air conditioning, water / energy usage and efficiency;
- Enhance biodiversity, green land planning and use, as well as circular economy and recycling.

3. Energy

- Address the entire energy value chain from supply to use: demonstrate energy efficient facilities for green energy production (e.g. electricity, advanced biofuels, green hydrogen) to power / electrify the built environment and infrastructure, transport and airport operations;
- Pilot waste-based biofuels refineries or retooling of existing ones, as a means of generating heat, power or producing sustainable alternative fuels;
- Identify effective incentives to address challenges in the sustainable alternative fuels system (e.g. fuel producers, fuel distributors, airport operators, airline operators) and to promote the penetration of sustainable alternative fuels within the aviation sector;
- Assess the scalability of solutions – e.g. enabling sustainable alternative fuel producers to cover investment risks and promote advanced technology, while securing buy-in of end users (airlines).

4. Cross-cutting aspects:

- Air quality (indoor, outdoor, cabin) and noise trade-off;
- Safety & security assurance for all innovative solutions;
- Circular economy and aircraft decommissioning;
- Eco-labelling and certifications (robust certification and green standards setting) and Measurement, Reporting and Verification (MRV);
- ICT to effectively manage resources and assets, including management of information and production of knowledge;
- Sustainable evolution of airports, including institutional and governance, ownership, regulation, performance indicators, balance of force between regulators, airlines and airport operators, in order to accelerate the production and use of sustainable energy;
- Feasibility of a market-based instrument to prevent/reduce Food Loss and Waste (FLW) and to valorise a business case of transformation of FLW into new bio-based products. This includes FLW measurement and monitoring methodologies and the subsequent mapping of FLW total volume at stake in the considered airport;
- Non-technological framework conditions, new multi-actor governance and investment analyses.

Area B: Green Ports

Perform large-scale, real-life high TRL demonstrations of green maritime and inland ports, addressing all of the following aspects:

- Demonstrate integrated low-emission energy supply and production at ports (e.g. electricity, green hydrogen, ammonia) and on-shore supply systems, with storage, distribution and power / re-charging / sustainable alternative fuel re-fuelling infrastructure for ships and other vehicles;
- Demonstrate sustainability and innovation beyond energy supply and demand at ports, particularly the integration with green and smart logistics and port operations, energy-efficient buildings, innovative construction, dredging and infrastructure activities, effective and green land use;
- Demonstrate seamless and highly efficient logistics operations, for integrated port-hinterland connections (e.g. with rail and road), to enable modal shifts and system-wide door-to-door multimodal passenger mobility and freight transport;
- Perform pilot activities to showcase the positive environmental effects of digitalisation in ports, particularly with connected and automated vehicles and cranes, as well as intelligent port systems and dynamic vessel traffic flows for improved routing and scheduling, to minimise ship time at port, enabling efficient logistics chains and multimodal inter-connections;
- Deliver new tools and optimisation mechanisms for passenger and freight flows into and out of the port, facilitating port access and reducing traffic from / to the city;

- Assess non-technological framework conditions, such as market mechanisms and potential regulatory actions in the short and medium term, which can provide financial/operational incentives and legal certainty for implementing low-emission solutions (e.g. considering first-mover advantage, best-equipped-best-served principle and port market share effects);
- Develop and promote new multi-actor governance arrangements that address the interactions between all port-related stakeholders, including port authorities, ship owners, local communities and city planning departments, in order to accelerate the production and use of sustainable energy;
- Deliver a Master Plan for the future Green Port, with a bold vision and a roadmap with milestones to achieve GHG neutral shipping and minimal pollution in maritime and inland port areas (incl. ships in and approaching port) by 2030, 2040 and 2050; as well as addressing the associated investment / cost implications (incl. operational and capital expenditures). This master plan should also address:
  - A wider socio-economic perspective, covering sustainable and smart mobility, technical, operational, economic, environmental and social aspects, relevant to shaping the green ports of the future and their integration with other transport modes, the hinterland, cities and urban mobility;
  - Solutions with the highest potential for emission reduction at ports, focusing on CO_2 and other emissions (SOX, NOX and particulates), as well as improving biodiversity, noise, the soil and the marine environment;
  - Analysis of the various alternatives for the provision of on-shore power supply at the port, such as fixed energy grid vs. mobile storage, barges or trucks bringing energy/batteries, etc.;
  - Assessment whether existing fossil fuel, LNG or other / chemical infrastructures at ports could be used to facilitate the transition towards bunkering of carbon neutral fuels;
  - A holistic green port design concept, leveraging green construction, demolition and dredging activities, with energy-efficient or renovated buildings, optimising land and sea/river use, improving biodiversity and circular economy;
  - Scalable solutions that can be replicated/gradually scaled-up to larger or scaled-down to smaller ports, together with the demonstration of their environmental sustainability and technical, operational, and economic viability;
  - Governance, business, deployment models and plans, including internal/external costs;
  - Collaboration models across multiple stakeholders, paving the ground for large-scale deployment of the demonstrated innovative solutions across European ports;
  - A comprehensive report of all project findings in detail, including the identified proposed suitable pathways for European ports to achieve GHG-neutrality;
  - A handbook on how to move from planning, to implementation, replication and scaling-up the deployment of the successful demonstrated solutions for different sizes and locations of ports across Europe.

In relation to both areas (Green Airports and Green Ports), proposals addressing all of the above aspects should incorporate field performance monitoring of at least 6 months before the innovative solutions are applied, followed by a period of at least 1 year within the project duration, in order to allow a comparison of the effectiveness of the deployable solutions.

Proposals should also provide a quantified assessment of the expected improvement in airport or port energy consumption, as well as in greenhouse gas emissions and air quality.

Each consortium should be led by one "Lighthouse" airport or port, which will demonstrate the novel concepts and solutions and a further two "Fellow" airports or ports that will follow closely the demonstration actions and are committed to implementing the best practices identified in the project. The consortium should also include academic and other partners. All participating airports or ports must be from different EU Member States or Countries associated to Horizon 2020.

The Commission considers that proposals requesting a contribution from the EU of EUR [X] million would allow this specific challenge to be addressed appropriately. Typically, projects should have a duration of 48 to 60 months. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts or durations. At least 15% of the requested EU contribution should be for the Fellow airports or ports.

Eligible costs are primarily those that concern the innovative elements of the project needed to:

- Foster innovative overall energy systems integration;
- Demonstrate effective integration of transport modes within and around the airport or port;
- Foster wider use of electrification and sustainable alternative fuels at airports or ports.

Costs of commercial technologies are not eligible, for example:

- Buildings: purchase, construction, retrofitting and maintenance;
- Electric vehicles and charging stations: purchase, installation and maintenance;
- ICT platforms: purchase, development and maintenance.

Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the two highest-ranked proposals in the area of A) Green Airports and B) Green Ports will be funded, provided that they attain all thresholds.

Expected Impact:

- Accelerated deployment of sustainable alternative fuels (including advanced biofuels, green hydrogen, ammonia) and electromobility in transport, as well as energy storage and waste heat recovery in airports and ports;
- On-site clean energy / fuel production and distribution (particularly green hydrogen and electricity) and increased alternative (bio-) fuel supply, with re-fuelling and re-charging capabilities;

- Zero-emission airport and port operations by 2030;
- Reduced aviation, waterborne and other transport emissions, as well as improved air quality, biodiversity, circular economy and reduction of noise at airports and ports;
- Energy-efficient and smart airport and port operations and buildings, green and smart logistics, integration with other low-emission transport modes;
- Reduced emissions for cities and urban mobility, as well as improved city integration for airports and ports;
- Clear commitments and contributions to Europe-wide take up of innovative solutions during and beyond the project are expected, which could be in the form of follow-up actions, for instance supported by EU's Connecting Europe Facility or other funding programmes;
- Significant, direct and immediate contribution to the achievement of the European Green Deal, as well as other EU transport policy objectives (including TEN-T), while strengthening the competitiveness of the EU transport sector.

Type of Action: Innovation Action

Budget: EUR [X] million