

Area 5: Sustainable and smart mobility

LC-GD-5-1-2020: Green airports and ports as multimodal 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 increase significantly by 2050 and the sector is already generating 14% of the EU GHG emissions from transport. At the same time, waterborne transport is accounting for approximately 90% of global trade and 13% of EU transport 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, logistics hubs and commercial sites, linking with other transport modes, hinterland connections and integrated with cities. As such, green airports and ports, as multimodal hubs in the post COVID-19 era for sustainable and smart mobility have a great potential to immediately start driving the transition towards GHG neutral aviation, shipping and wider multimodal mobility already by 2025. This topic addresses innovative concepts and solutions for airports and ports, in order to urgently reduce transport GHG emissions and increase their contribution to mitigating climate change.

Scope

Building on best practices (technological, non-technological and social), as well as ongoing projects and planned initiatives in European airports and ports, proposals should address the activities EITHER under area A) Green Airports OR under area B) Green Ports. Proposals should clearly indicate which area they are covering.

Area A: Green Airports

Perform large-scale, real-life high TRL demonstrations of green airports, addressing the topics a), b) and c) listed under heading “1. Transport” and integrating a number of the constitutive aspects listed below them, as well as a minimum of half the aspects listed under each of the three remaining headings (“2. Terminal”, “3. Energy” and “4. Cross-cutting aspects”), collectively describing the various airport aspects to be considered:

1. Transport

- a) Access and multimodal connections to the airport (e.g. from cities or other nodes)
- b) From the airport terminal to the aircraft (airside)
- c) At the airport landside (logistics, ground handlings and operations, as well as green energy production/supply of sustainable alternative fuels or electricity)

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- Demonstrate low-emission energy use (electrification or sustainable alternative fuels) for aircraft, airports, other / connected and automated vehicles accessing or operating at airports (e.g. road vehicles, rolling stock, drones), as well as for public transport and carpooling, with re-charging/re-fuelling stations and use of incentives;
- Showcase the use of innovative de-icing and anti-icing procedures and infrastructures;
- Apply innovative digital / satellite-based solutions, including new tools and traffic optimisation mechanisms for multimodal access, passenger and freight flows into and out of the airport, as well as between airports, facilitating airport access and reducing traffic from / to the city or other nodes;
- Promote the development of sustainable alternative fuels production facilities, as well as the necessary underlying infrastructure (for distribution, fuel handling logistics and blending operations) to facilitate the conversion of airport waste to sustainable alternative fuels and the delivery of the fuels to the airport, for small and medium airports, scalable to large airports, therefore allowing deployment at a significant number of airports;
- Promote intermodal mobility and modal shift (e.g. in the context of Mobility/Logistics as a Service or transport-on-demand), including efficient rail interconnection solutions and innovative train-airport station concepts;
- Develop and prepare the implementation of 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, in view of future implementation of an autonomous, integrated and operational EU-CHSK.

2. Terminal

- Demonstrate integration of new solutions with operations, green and smart logistics and infrastructures;
- Develop the green built environment (construction/demolition) and improve procurement processes;
- Improve the energy efficiency of buildings; optimise services such as lighting, heating, natural ventilation and air conditioning (taking into account strict public health criteria), water / energy usage and efficiency; utilise low ecological impact materials;
- Enhance biodiversity, green land planning and use, as well as circular economy and recycling (in the context of zero-waste concepts).

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, synthetic kerosene, mixture SAF / Jet A1, green hydrogen) to power / electrify the built environment and infrastructure, transport and airport ground operations;
- Envisage industrial scale pilot advanced biofuels refineries or retooling of existing fuel refineries, as a means of producing sustainable alternative fuels and generating additional heat and power in an efficient manner and minimal environmental impact;
- 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 (air operators).

4. Cross-cutting aspects:

- Air quality (indoor, outdoor, including decontamination from microbiological pathogens) and noise trade-off;
- Impact on the existing legal framework covering operational and environmental aspects, eco-labelling, certifications (robust certification and green standards setting) and Measurement, Reporting and Verification (MRV);
- Use of ICT and satellite-based solutions to effectively manage resources and assets, including management of information and production of knowledge, taking into account all the related safety and security aspects of the solutions developed and proposed;
- Sustainable evolution of airports, including their integration into the circular economy, by considering the collection/sorting of recyclable waste and activities linked to aircraft decommissioning, institutional and governance aspects, 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 sustainable maritime and inland ports, addressing at least 6 of the following 8 aspects:

- Demonstrate integrated low-emission energy supply and production at ports (e.g. electricity, green hydrogen, advanced biofuels and bioliquids) and supply systems (on-shore or off-shore), with storage, distribution and power / re-charging / sustainable alternative fuel re-fueling infrastructure for ships and other vehicles operating at/to/from ports, as well as for other uses (e.g. port equipment/machinery, on-shore power supply systems for vessels mooring in the port, etc.);
- Demonstrate sustainability and innovation beyond energy supply and demand at ports, particularly the integration with green and smart logistics and operations at/to/from ports, energy-efficient buildings, innovative construction, dredging and infrastructure activities, effective and green land use;
- Demonstrate seamless and highly efficient logistics operations, for integrated sea/river-port-hinterland connections (e.g. between sea/river, 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 (incl. satellite-based solutions) in ports, particularly with clean (e.g. electrified / hydrogen) 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 and automated logistics chains and multimodal inter-connections;
- Deliver new tools and optimisation mechanisms for multimodal access, passenger and freight flows into and out of the port, as well as between ports, facilitating port access and reducing traffic from / to the city or other nodes;
- 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 principles 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, civil society organisations and city, regional or national 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:

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- 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 sustainable transport modes, the hinterland, cities and urban mobility;
- Solutions with the highest potential for emission reduction at ports, focusing on CO₂ and noxious pollutant emissions (SO_x, NO_x and particulates), as well as water pollution and noise, but also on improving biodiversity, the soil and the aquatic environment, while considering climate change effects (e.g. sea/river-level rise, new tourism patterns, etc.);
- Analysis of the various alternatives for the provision of power supply at the port, such as fixed land energy grid vs. mobile power production and supply (e.g. LNG generators/containers) and mobile storage, for instance through the use of barges or trucks bringing energy/batteries, etc.;
- Assessment whether existing fossil fuel, LNG or other / chemical infrastructures in the broader port areas could be used to facilitate the transition towards low-emission shipping and bunkering of carbon neutral fuels;
- A holistic sustainable 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, by use of standardised tools for assessing the comparative emission reduction of different ports;
- A handbook on how to move from planning, to implementation, replication and scaling-up the deployment of the demonstrated solutions, for different sizes and locations of ports across Europe.

Applicable to both Area A: Green Airports and Area B: Green Ports

Proposals for both areas (Green Airports and Green Ports), addressing the aspects described above should, where appropriate, incorporate field performance monitoring with a view to assessing the effectiveness of the deployable solutions. This should be determined by measuring the performance difference (for comparable activity levels) between the initial status, considered

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before the innovative solutions are applied (baseline), and the status at a point in time at least 2 years into the project, after a number of the solutions produced by the project have been applied.

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 three (at most) “Fellow” airports or ports that will be actively associated in helping to define and incorporate their specificities in the more general approach and solutions, follow closely the demonstration actions and are committed to implement the best practices identified and results produced by the project. For Green Ports, each consortium should include at least one inland port. All consortia should also include academic and other partners (e.g. rail, road). All participating airports or ports must be from different EU Member States or Countries associated to Horizon 2020. All projects in each area must commit to collaborate, share a common communication strategy and organise common events.

The Commission considers that proposals requesting a contribution from the EU of between EUR 20 and 25 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. A maximum of 20% 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 green hydrogen, 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 and maintenance.

Grants will be awarded to proposals according to the overall 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 they attain all thresholds.

Expected Impact

- Accelerated deployment of sustainable alternative fuels (including advanced biofuels), green hydrogen and electromobility in transport, as well as sustainable energy supply and storage and waste heat recovery in airports and ports;
- Clean energy / fuel production and distribution (particularly green hydrogen and electricity) and increased alternative (bio-) fuel supply, with re-fueling and re-charging capabilities;
- Green airports and ports as multimodal hubs, optimising passenger and freight flows for low emission mobility, in a context of much stricter public health criteria;
- Energy-efficient and green airport and port operations and buildings, green and smart logistics, integration with other low-emission transport modes (in particular rail) and promoting effective modal shifts;
- Reduced aviation, waterborne and other transport emissions, as well as improved air quality, biodiversity, better integration in the circular economy and reduction of noise at airports and ports;
- 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 technological, non-technological and socially 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 European transport sector.

Type of Action: Innovation Action (IA)