ARTES 4.0 Generic Programme Line Business Applications - Space Solutions

“Maritime Decarbonisation – Ports Decarbonisation”

THEMATIC CALL FOR PROPOSALS

Prepared by	ESA
Reference	ESA-CICA-SOW-2024-2815
Issue/Revision	1.0
Date of Issue	25/11/24
Status	Final

Table of Contents

Table of Acronyms

AIS	Automatic Identification System
AoF	Authorisation of Funding
APQ	Activity Pitch Questionnaire
ARTES	Advanced Research in Telecommunications Systems
BASS	Business Applications and Space Solutions
CET	Central European Time
ESA	European Space Agency
ETS	Emissions Trading System
EU	European Union
FP	Full Proposal
GHG	Green House Gas
GMDSS	Global Maritime Distress and Safety System
GNSS	Global Navigation Satellite System
GT	Gross Tonnage
IMO	International Maritime Organisation
IoT	Internet of Things
MASS	Maritime Autonomous Surface Ships
MEPC	Marine Environment Protection Committee
MPA	Marine Protected Areas
MSC	Maritime Safety Committee
OP	Outline Proposal
OSIP	Open Space Innovation Platform
PSI	Project Security Instruction
ROC	Remote Operations Centre
RTK	Real Time Kinematic
SOLAS	Safety of Life at Sea
SPL	Strategic Programme Line
VDES	VHF Data Exchange System

1. OVERVIEW

This document presents an overview of the third pillar of the "Maritime Decarbonisation" thematic call for proposals - "Ports Decarbonisation".

The call for proposals, issued under the ARTES BASS, 4S and 5G programme lines. The call is aimed at supporting the development of sustainable space-based services and applications that address challenges related to the decarbonisation of the maritime industry with a focus on the Port ecosystem.

2. BACKGROUND AND RATIONALE

A new paradigm is emerging in the maritime sector driven by the need to mitigate its impact on the environment. The transformation, driven by economic, social, and regulatory pressures will be a decades-long effort but has the potential to revolutionise the impact maritime industry has on the environment.

An important element of maritime sustainability, and the subject of the present call, is the decarbonisation of the maritime industry. Shipping is recognised as the most efficient form of commercial transport in terms of CO2 emissions per tonne of cargo transported in one mile[1]. However, due to the scale of the industry, maritime transport is still a significant contributor to the world's total greenhouse gas emissions (around 3% of total global CO2 emissions).

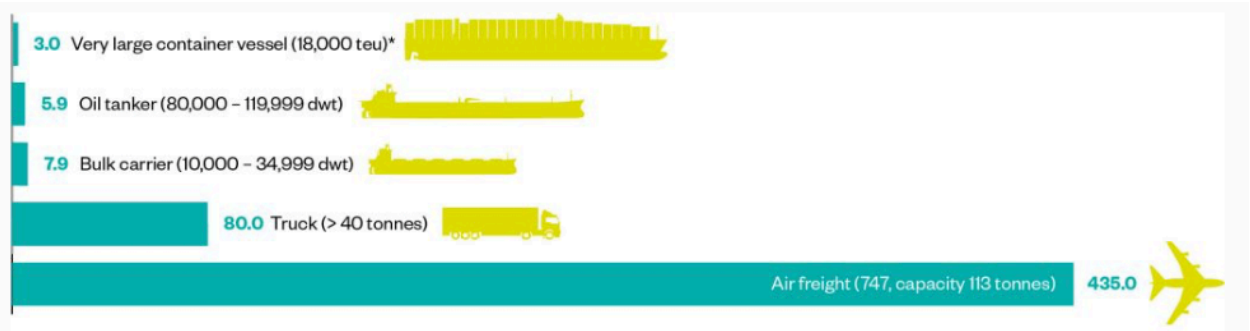

Figure 1: Comparison of typical CO2 emissions between modes of transport, in grams/tonne-km[2]

In recent years, there have been significant efforts to enhance fuel efficiency in various fronts, such as route optimisation or hull and propeller design. However, achieving net-zero goals requires a profound transformation of the sector, where ports are poised to play an integral role.

This transformation is not only prompted by societal and economic pressures, but it is also underpinned by the release of several long-awaited regulatory frameworks from European and International maritime authorities. Notably, in 2023 and 2024, the following key

[1] https://www.ics-shipping.org/shipping-fact/environmental-performance-environmental-performance/

[2] ICS Fueling the Fourth Propulsion Revolution: Full Report, based on IMO, Second GHG Study, 2009

agreements were enacted:

- At the 80th session of the Marine Environment Protection Committee (MEPC80), the International Maritime Organisation (IMO) adopted the 2023 Strategy on Reduction of GHG Emissions from Ships. The revised IMO GHG Strategy includes an enhanced common ambition to reach net-zero GHG emissions from international shipping close to 2050, a commitment to ensure an uptake of alternative zero and near-zero GHG fuels by 2030, as well as indicative check-points for 2030 and 2040.[3]

- Since January 2024, European shipping (5000 GT and above) is subject to EU's Emissions Trading System (EU ETS). The system covers i) 50% of emissions from voyages starting or ending outside of the EU (allowing the third country to decide on appropriate action for the remaining share of emissions); and ii) 100% of emissions that occur between two EU ports and when ships are within EU ports. The EU ETS covers CO2 (carbon dioxide), CH4 (methane) and N2O (nitrous oxide) emissions, but the latter two only as from 2026.[4]

Maritime decarbonisation is a broad subject that requires the involvement of and advancements from various stakeholders. To mirror the multifaceted nature of the required transformations and address the specific needs of different decarbonisation approaches, the Call has been organized into four sub-themes: i) Digitalisation and logistics optimisation, ii) Maritime Autonomy, iii) Ports Decarbonization, and iv) Green Propulsion.

The present document addresses the third sub-theme: Ports Decarbonisation. Ports play a pivotal role in maritime decarbonisation, serving as hubs for enabling the transition to cleaner and more sustainable shipping practices. Ports are more than just logistical centres — they are strategic enablers in the decarbonisation of the maritime sector.

By implementing these measures, ports can transform into green hubs that not only minimise environmental impacts but also drive innovation and sustainable economic growth. This transformation is essential for the broader decarbonisation of global trade and transport systems.

[3] https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC-80.aspx
[4] https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-shipping-sector_en

3. OBJECTIVES OF THE CALL

The objective of the call subtheme is to develop new services that support the decarbonisation of Ports, or the decarbonisation of the maritime sector through Ports developments. This subtheme includes the following topics, although bidders are encouraged to propose additional services not listed below that contribute to the decarbonisation of ports ecosystems:

- **Digitalisation and efficiency improvements:** By adopting smart technologies and space-enabled digital platforms, ports can optimise their operations and enhance the efficiency of cargo handling. Efficient port operations improve competitiveness of all parties while reducing carbon emissions.
- **Renewable Energy Integration:** Ports can become renewable energy hubs by integrating solar, wind, and other renewable sources to power their operations and provide clean energy to vessels. Space assets can support the planning and operations optimisation of green energy sources, improving their effectiveness and reliability.
- **Green Electrification and Shore Power:** Ports play a significant role in reducing emissions from ships during berthing by cold ironing, allowing vessels to plug into the electrical grid instead of using auxiliary engines powered by fossil fuels. Electrifying port operations, such as cranes, vehicles, and cargo-handling equipment, further minimises the port's own carbon footprint. Space assets can aid in planning and forecasting grid loads to optimise the electrical power infrastructure.
- **Port vehicles Autonomy:** Autonomy can be introduced to port land infrastructure, such as cranes and other land vehicles, as well as water vehicles like bathymetric survey vessels. These systems can utilise precise positioning, navigation, and timing (PNT) systems, as well as reliable hybrid terrestrial/satellite 5G connectivity, to enhance operations. Autonomous systems often can reduce emissions by optimising operations and reducing size and complexity of the vehicle.
- **Monitoring of emissions:** Satellites, in combination with in-situ sensors, can provide critical information on port emissions and their impact on surrounding environments and populations. In addition to monitoring carbon dioxide (CO_2), the increasing adoption of LNG-powered vessels makes the tracking of methane (CH_4) emissions particularly important. Furthermore, monitoring pollutants such as sulphur oxides (SO_x), nitrogen oxides (NO_x), and particulate matter is essential due to their harmful effects on human health and natural ecosystems.

4. SPACE ASSETS

Some of the uses of various space assets is outlined below.

- **Satellite Positioning and Timing:** Advanced Global Navigation Satellite Systems (GNSS) enable automation of several equipment by providing precise positioning and timing. For example, Real-Time Kinematic (RTK) technology can be used for high-accuracy applications such as crane positioning. GNSS also provides ships with accurate positioning data, which feeds into smart platforms and analytical tools to enhance operational efficiency.
- **Satellite Communications:** Reliable, ubiquitous, and resilient data connectivity is critical for autonomous systems both terrestrial and maritime. Hybrid terrestrial/satellite networks can support essential communications infrastructure. Satellite-based Internet of Things (IoT) solutions can connect a port's remote sensors and equipment, while systems such as Satellite Automatic Identification System (AIS) and VHF Data Exchange System (VDES) provide essential information for operations planning and coordination.
- **Satellite Earth Observation:** SatEO can enhance port situational awareness and support the monitoring of emissions, helping ports optimise operations and reduce environmental impacts.

5. SCOPE OF THE CALL

The proposals under this Call for Proposal shall contribute to the decarbonisation of the ports ecosystem, or to the decarbonisation of the maritime sector through port developments, with innovative user-driven integrated downstream services that rely on advanced technologies and space data.

This Call for Proposals covers two types of activities:

1. **Feasibility Studies**, which provide the preparatory framework to identify, analyse and define new potentially sustainable services. The applications and/or services covered by the proposed Feasibility Studies must:
    - Be customer/user driven and present a strong sustainability potential.
    - Propose a service demonstrating the benefits of the utilisation of integrated space assets.
    - Include a viability analysis.
    - Aim to evolve the targeted applications and services to marketability and operational roll-out, potentially through a Demonstration Project after successful completion of the feasibility study.
    - Address maritime decarbonisation through maritime autonomy.

2. **Demonstration Projects**, dedicated to the implementation and demonstration of pre-operational services. The applications and/or services covered by the proposed Demonstration Projects must:
    - Be customer/user driven (including user involvement and active participation in the project).
    - Propose a service demonstrating the benefits from the utilisation of space assets with clear potential to become sustainable.
    - Address maritime decarbonisation through maritime autonomy.
    - Provide a measurable socio-economic impact.
    - The Bidder shall involve in the project representatives from user communities, which shall take part in the pilot.

    For Demonstration Projects, the Bidder shall involve in the project representatives from user communities, who shall take part in the pilot.

    The service provider shall be identified and be part of the bidding team to ensure the commercial operational roll-out of the proposed service following completion of a demonstration project.

6. PROCUREMENT APPROACH

The proposals submitted in reply to the call shall be implemented in the context of ESA BASS, 5G and 4S programme lines of ARTES in coordination with National Delegations.

The Bidder shall submit first an Activity Pitch Questionnaire, and following evaluation, may be invited to submit the Outline and Full Proposal. The Activity Pitch Questionnaire (APQ) template provided by ESA shall be used. This is considered as entry point for companies to submit their idea, providing a simplified and single point of access to the ESA ARTES framework.

The price of activities carried out in a given State are charged against the contribution of that State in the programme. A letter of Authorisation of Funding (AoF) from the relevant National Delegation is therefore required as part of the Full Proposal. The Bidder is however advised to inform the relevant National Delegation(s) when submitting the Pitch. The contact information of the National Delegates can be found here:
https://artes.esa.int/national-delegations.

The Agency will admit for evaluation only (Outline and Full) proposals from a bidding team composed of a company and/or organisation - be it as Prime or Subcontractor - residing in any of those states that subscribe to the Programme under which you wish to submit your proposal:

I. **for the ARTES 4.0 BASS Generic Programme Line - Component A**: Business Applications. To date, Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Sweden, Switzerland

and the United Kingdom have subscribed.

II. **for the ARTES 4.0 5G Strategic Programme Line**: Austria, Belgium, Finland, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland, the United Kingdom and Canada have subscribed.

III. **for the ARTES 4.0 4S Strategic Programme Line:** Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Norway, Portugal, Romania, Spain, Switzerland, the United Kingdom and Canada have subscribed.

7. PROCESS AND SCHEDULE

It is planned for the call for proposals to be opened on 29th November 2024 until the 15th February 2025, 13:00 CET.

7.1. Timeline and Procedure

This thematic call's sub-theme is open for a period of 10 weeks, where the Bidders can respond by submission of pitches.

The Call is planned to be implemented according to the following stepwise approach:

In **Step 1**, the interested Bidders are requested to submit their proposal(s) based on a short Activity Pitch Questionnaire (APQ) template made available by ESA that can be downloaded from the Thematic Call website. The pitch should provide the initial idea of what the Bidder would like to propose, elaborated on the basis of the thematic areas and either the use cases proposed by ESA's partners or others selected by the Bidder. If the Bidder has the relevant information available to them, they may consider completing the supplementary questions (AP5) in the APQ template as part of the APQ+, which may allow to skip Step 3 below, at ESA's discretion.

The completed Activity Pitch Questionnaire (APQ) shall uploaded using the online web submitter, ESA's open space innovation platform (OSIP) in the channel named "APQ for ARTES Downstream Business Applications"

Multiple Pitches with different ideas can be submitted.

It is strongly recommended that the interested Bidder liaises from the beginning with the relevant ESA Member States Delegates.

In **Step 2**, following an assessment of the pitch by ESA, ESA will provide feedback to the company, aiming to provide a reply within 10 working days following the deadline for submission of the pitch.

It is recognised that some interactions with the Bidder may be required, and ESA may therefore consult with the Bidder and may offer support in providing further clarifications,

aimed at better shaping the Outline Proposal(s). Dialogue sessions may be organised individually with potential partners prior to Step 3.

ESA might also consult, when necessary, with the relevant National Delegation(s) for orientation and will provide key information (e.g. title, cost, price, subcontractor) to the relevant National Delegation(s).

Subject to a positive evaluation of the pitch and the Bidder having informed the National Delegation(s), the Bidder will be notified by ESA and invited to submit an Outline Proposal. Note that the APQ+ can act as a substitute for the Outline Proposal, thus if having adequately answered the additional questions included in the APQ+, the Bidder may be able to skip Step 3.

In **Step 3**, the Bidder will submit the Outline Proposal, based on a template provided by ESA, with letter(s) of interest from users/stakeholders. The Outline Proposal expands upon the pitch with a more extensive level of details. The Bidder will be allowed 3 months from the APQ acceptance notification to submission of their Outline Proposal. The outline proposal shall be submitted on the OSIP platform under the channel "Outline Proposal for ARTES Downstream Business Applications – Feasibility Studies/Demonstration Projects".

In **Step 4**, subject to a positive assessment from ESA and in-principle support from the National Delegations, the Bidder will be invited to submit a Full Proposal on ESA-STAR in accordance with BASS programme line. The Bidder will be allowed 12 months from submission of their Outline Proposal to submit their Full Proposal on ESA-STAR.

In **Step 5**, the Bidder will submit a Full Proposal with the Authorisation of Funding (AoF) from the relevant National Delegation(s). Following a positive assessment by ESA the proposed activity will be approved for implementation.

7.2. Evaluation Criteria

The evaluation process is non-competitive, as each proposal will be assessed individually on its own merits, according to the evaluation criteria applicable for CALL FOR PROPOSALS FOR DOWNSTREAM APPLICATIONS IN ARTES 4.0 (esa star ref.: 1-10494).

More information for the assessment of the APQ and outline proposal stages can be found on the OSIP page "APQ for ARTES Downstream Business Applications".

More information on the evaluation criteria for the final proposals can be found within the document "Appendix 1 to AO/1-10494/20/NL/CLP (Issue 2.2)" which can be found on ESA-STAR and the activity webpage.

8. GENERAL CONDITIONS

The submissions and all correspondence relating to it shall be in English.

The tender shall not contain any Classified Information, whether in the pitch, Outline Proposal or in the Full Proposal. To avoid any confusion with Classified security markings, the unclassified protective marking used by the Tenderer in the proposal shall not contain the terms: "Restricted", "Confidential", or "Secret".

However, should the Tenderer consider necessary to include Classified Information in the tender, the Tenderer shall inform beforehand the ESA Security Officer.

The Tenderers are informed that Classified Information can be shared with ESA only in compliance with the Project Security Instruction (PSI) duly established by the Agency beforehand and subject to the approval by the ESA Member States.

The Agency will treat commercially sensitive or proprietary information confidentially and solely for the purpose of the assessment of the response.

Expenses incurred in the preparation and dispatch of the response to the announcement will not be reimbursed. This includes any expenses connected with a potential dialogue phase.

The announcement does not bind the Agency in any way to place a contract. The Agency reserves the right to issue amendments to the announcement.