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Horizon 2020

Call: H2020-LC-GD-2020

(Building a low-carbon, climate resilient future: Research and innovation
in support of the European Green Deal)

Topic: LC-GD-5-1-2020

Type of action: IA

Proposal number: 101037019

Proposal acronym: GREENING PORTS

Deadline Id: H2020-LC-GD-2020-1

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How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the steps in the submission wizard.

Proposal Submission Forms

Proposal ID 101037019

Acronym GREENING PORTS

1 - General information

Topic LC-GD-5-1-2020

Type of Action IA

Call Identifier H2020-LC-GD-2020

Deadline Id H2020-LC-GD-2020-1

Acronym GREENING PORTS

Subtopic Area B: Green Ports

Proposal title Greening Ports, act for an inclusive and sustainable future

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months

54

Fixed keyword 1

Decarbonisation in maritime

Fixed keyword 2

Energy

Fixed keyword 3

Hydrogen

Fixed keyword 4

Port

Fixed keyword 5

Transport & Mobility

Fixed keyword 6

Air quality

Free keywords

Fast Replicability, Widening zone members states, EU-satellite data and services, co design, citizen engagement, digitalization ,

Proposal Submission Forms

Proposal ID 101037019

Acronym GREENING PORTS

Abstract

Our project proposal, Greening Ports, Act for an Inclusive and Sustainable Future, aims to design, develop and demonstrate an entire panel of technological and non-technological activities, answering to up to seven (7) demonstration actions (TRL6) of the call, towards the successful transformation of European ports into Green ports of the Future. Our proposal's comparative advantage rely on fast replicability by 1) medium-size ports in widening zone as target, allowing for more flexibility and faster impact visibility, 2) space-based technology in monitoring and impact assessment, 3) a set of competitive/ready-to-be-implemented services, and 4) industrial and multidisciplinary Consortium. From 8 EU Member states, our consortium brings together, the industry, academia and research centers, +10 European start-ups/SMEs, legal, communication and consulting experts, as well as a port stakeholders' panel. Our project proposal GREENING PORTS will co-create a new concept for the EU medium-size port making it a more liveable space, cleaning its air, improving its mobility, optimising its resource consumption and integrating citizens' voice in the whole process. These new multimodal hubs will drastically reduce GHG and other pollutant emissions (-15%) produced by the maritime transport, adapting and scaling-up a set of new operational services. A digital platform (named dashboard) will ensure impact monitoring to continuously support the ports' operations in the most sustainable way, beyond the lifetime of the project. To address all aspects, we put forward a number of technological solutions, referring to innovative digital and industrial services (including low carbon energy, green mobility logistics, environmental monitoring) accompanied by non-technological activities, namely citizens' cooperation, clustering activities and Ports' Taskforces, as well as the establishment of regulatory and standardization frameworks regarding polluting emissions at sea/port interface

Remaining characters

5

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under Horizon 2020 or any other EU programme(s)?

☐ Yes ☒ No

Please give the proposal reference or contract number.

XXXXXX-X

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Acronym GREENING PORTS

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	<input checked="" type="checkbox"/>
2) The information contained in this proposal is correct and complete.	<input checked="" type="checkbox"/>
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	<input checked="" type="checkbox"/>
4) The coordinator confirms:	
- to have carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was “weak” or “insufficient”, the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	<input checked="" type="radio"/>
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	<input type="radio"/>
- as sole participant in the proposal is exempt from the financial capacity check.	<input type="radio"/>
5) The coordinator hereby declares that each applicant has confirmed:	
- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	<input checked="" type="checkbox"/>
- they have the financial and operational capacity to carry out the proposed action.	<input checked="" type="checkbox"/>
The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the [privacy statement](#). Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the [Privacy statement for the EDES Database](#).

Proposal Submission Forms

Proposal ID 101037019

Acronym GREENING PORTS

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	CAPGEMINI TECHNOLOGY SERVICES	FR	
2	Port of Gdynia Authority S.A.	PL	
3	VALSTYBES IMONE KLAIPEDOS VALSTYBINIO JURU UOSTO DIREKCIJA	LT	
4	PORT AUTONOME DE STRASBOURG	FR	
5	EUROGATE CONTAINER TERMINAL LIMASSOL LIMITED	CY	
6	THE CYPRUS INSTITUTE	CY	
7	UNIVERSITA DEGLI STUDI DI GENOVA	IT	
8	KLAIPEDOS UNIVERSITETAS	LT	
9	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	EL	
10	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR	
11	Hugo Grotius gGmbH - gemeinnützige Gesellschaft zur Förderung der Rechtswissenschaften	DE	
12	THALES ALENIA SPACE FRANCE SAS	FR	
13	THREE O'CLOCK	FR	
14	Capgemini Consulting	FR	
15	DNV Italia srl	IT	
16	GEOSYSTEMS HELLAS IT KAI EFARMOGESGEOPLIROFORIAKON SYSTIMATON ANONIMIETAIRESIA	EL	
17	Capgemini DEMS France	FR	
18	ALTRAN TECHNOLOGY & ENGINEERING CENTER	FR	
19	FACTUAL CONSULTING SL	ES	
20	ON AIR S.R.L.	IT	
21	CREOTECH INSTRUMENTS SPOLKA AKCYJNA	PL	

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22	SINAY	FR	
23	STUDIO ITINERANTE ARQUITECTURA SL	ES	
24	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	ES	
25	Fine Bubble Technologies Sp. z o.o.	PL	
26	W?RTSIL? VOYAGE LIMITED	IE	

2 - Administrative data of participating organisations

PIC	Legal name
947643150	CAPGEMINI TECHNOLOGY SERVICES

Short name: CG

Address of the organisation

Street 5-7 RUE FREDERIC CLAVEL

Town SURESNES

Postcode 92287

Country France

Webpage <http://www.capgemini.com>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno	Legal personyes
Non-profitno	
International organisationno	
International organisation of European interestno	Industry (private for profit).....yes
Secondary or Higher education establishmentno	
Research organisationno	

Enterprise Data

SME self-declared status.....07/12/2004 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CG

Department(s) carrying out the proposed work

Department 1

Department name

Space & ATM department

☐ not applicable

☐ Same as proposing organisation's address

Street

106 Avenue du G n ral Eisenhower

Town

Toulouse

Postcode

31036

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	
Same Group	Capgemini Consulting	
Same Group	Capgemini DEMS France	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CG

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☐

Male

☒

Female

First name Carine

Last name SA?T

E-Mail carine.saut@capgemini.com

Position in org.

Business developper

Department

CAPGEMINI TECHNOLOGY SERVICES

☒

Same as
organisation name

☐ Same as proposing organisation's address

Street

106 Avenue du G?n?ral Eisenhower

Town

Toulouse

Post code

31036

Country

France

Website

http://www.capgemini.com

Phone

+33762738119

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
stephane	mely	stephane.mely@capgemini.com	+33582284066
martin	derouineau	martin.derouineau@capgemini.com	+33249531715

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name PGA SA

PIC 947744321 **Legal name** Port of Gdynia Authority S.A.

Short name: PGA SA

Address of the organisation

Street Rotterdamka 9 Str.
Town Gdynia
Postcode 81-337
Country Poland
Webpage <http://www.port.gdynia.pl>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown	Legal personyes
Non-profitunknown	
International organisationunknown	
International organisation of European interestunknown	Industry (private for profit).....unknown
Secondary or Higher education establishmentunknown	
Research organisationunknown	

Enterprise Data

SME self-declared status..... unknown
SME self-assessment unknown
SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name PGA SA

Department(s) carrying out the proposed work

Department 1

Department name

Security and Monitoring Department

☐ not applicable

☒ Same as proposing organisation's address

Street

Rotterdamska 9 Str.

Town

Gdynia

Postcode

81-337

Country

Poland

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name PGA SA

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Micha?

Last name ?wieczkowski

E-Mail m.swieczkowski@port.gdynia.pl

Position in org.

Head of the Security and Monitoring Department

Department

Security and Monitoring Department

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

Rotterdamska 9 Str.

Town

Gdynia

Post code

81-337

Country

Poland

Website

http://www.port.gdynia.pl

Phone

+48586274115

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Bartosz	Langowski	b.langowski@port.gdynia.pl	+XXX XXXXXXXXXX
Katarzyna	Hlebowicz-Wojciechowsk	k.hlebowicz@port.gdynia.pl	+48586215269

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KSSA

PIC 951975364 **Legal name** VALSTYBES IMONE KLAIPEDOS VALSTYBINIO JURU UOSTO DIREKCIJA

Short name: KSSA

Address of the organisation

Street J JANONIO 24

Town KLAIPEDA

Postcode 92251

Country Lithuania

Webpage www.portofklaipeda.lt

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KSSA

Department(s) carrying out the proposed work

Department 1

Department name

Marketing Department

☐ not applicable

☒ Same as proposing organisation's address

Street

J JANONIO 24

Town

KLAIPEDA

Postcode

92251

Country

Lithuania

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KSSA

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex

☐

Male

☒

Female

First name Kristina

Last name Gontier

E-Mail k.gontier@port.lt

Position in org.

International Relations and Protocol Manager

Department

Marketing Department

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

J JANONIO 24

Town

KLAIPEDA

Post code

92251

Country

Lithuania

Website

www.portofklaipeda.lt

Phone

+37062043192

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Aleksandras	Kaupas	a.kaupas@port.lt	+37068677382

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name PAS

PIC

936764309

Legal name

PORT AUTONOME DE STRASBOURG

Short name: PAS

Address of the organisation

Street 25 rue de la Nu?e bleue

Town Strasbourg

Postcode 67002

Country France

Webpage www.strasbourg.port.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....27/08/2014 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name PAS

Department(s) carrying out the proposed work

Department 1

Department name Development and Promotion Department

☐ not applicable

☒ Same as proposing organisation's address

Street 25 rue de la Nu?e bleue

Town Strasbourg

Postcode 67002

Country France

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **101037019** Acronym **GREENING PORTS** Short name **PAS**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex



Male



Female

First name **St?phanie**

Last name **TREGER**

E-Mail **s.treger@strasbourg.port.fr**

Position in org.

Project manager

Department

Port development



Same as
organisation name

☒ Same as proposing organisation's address

Street

25 rue de la Nu?e bleue

Town

Strasbourg

Post code

67002

Country

France

Website

www.strasbourg.port.fr

Phone

+33629725257

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Emilie	GRAVIER	e.gravier@strasbourg.port.fr	+33674940237

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name EUROGATE CTL

PIC 893171054 Legal name EUROGATE CONTAINER TERMINAL LIMASSOL LIMITED

Short name: EUROGATE CTL

Address of the organisation

Street ?????????, 13
Town Limassol
Postcode 3032
Country Cyprus
Webpage <http://www1.eurogate.de/en/EUROGATE/Terminals/Limassol>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown	Legal personyes
Non-profitunknown	
International organisationunknown	
International organisation of European interestunknown	Industry (private for profit).....unknown
Secondary or Higher education establishmentunknown	
Research organisationunknown	

Enterprise Data

SME self-declared status..... unknown
SME self-assessment unknown
SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name

EUROGATE CTL

Department(s) carrying out the proposed work

Department 1

Department name

Operations, Technical Department

☐ not applicable

☒ Same as proposing organisation's address

Street

?????????, 13

Town

Limassol

Postcode

3032

Country

Cyprus

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name EUROGATE CTL

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex



Male



Female

First name Petros

Last name DIAS

E-Mail petros.dias@eurogate-limassol.com

Position in org. Health Safety Security Environment Manager

Department HSSE



Same as organisation name

☒ Same as proposing organisation's address

Street ?????????, 13

Town Limassol

Post code 3032

Country Cyprus

Website http://www1.eurogate.de/en/EUROGATE/Terminals/Limassol

Phone 0035799427143

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
George	Pouros	george.pouros@eurogate-limassol.com	0035799378199

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name Cyl

PIC

965934440

Legal name

THE CYPRUS INSTITUTE

Short name: Cyl

Address of the organisation

Street CONSTANTINOU KAVAFI 20

Town NICOSIA

Postcode 2121

Country Cyprus

Webpage www.cyi.ac.cy

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....12/10/2005 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name Cyl

Department(s) carrying out the proposed work

Department 1

Department name Climate and Atmosphere Research Center (CARE-C)

☐ not applicable

☒ Same as proposing organisation's address

Street CONSTANTINO KAVAFI 20

Town NICOSIA

Postcode 2121

Country Cyprus

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name Cyl

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Prof.

Sex

☒ Male

☐ Female

First name Jean

Last name Sciare

E-Mail j.sciare@cyi.ac.cy

Position in org.

Director of CARE-C

Department

Climate and Atmosphere Research Center (CARE-C)

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

CONSTANTINO KAVAFI 20

Town

NICOSIA

Post code

2121

Country

Cyprus

Website

https://emme-care.cyi.ac.cy/

Phone

+357 22 208 675

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Andri	Charalambous	a.charalambous@cyi.ac.cy	+35722397537

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name UNIGE

PIC

999976687

Legal name

UNIVERSITA DEGLI STUDI DI GENOVA

Short name: UNIGE

Address of the organisation

Street VIA BALBI 5

Town GENOVA

Postcode 16126

Country Italy

Webpage www.unige.it

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....31/08/1933 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name UNIGE

Department(s) carrying out the proposed work

Department 1

Department name

DITEN

☐ not applicable

☐ Same as proposing organisation's address

Street

VIA OPERA PIA 11A

Town

GENOVA

Postcode

16145

Country

Italy

Department 2

Department name

CIELI

☐ not applicable

☐ Same as proposing organisation's address

Street

Via Vivaldi 5

Town

GENOVA

Postcode

16126

Country

Italy

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name UNIGE

Department 3

Department name

DDG

☐ not applicable

☒ Same as proposing organisation's address

Street

VIA BALBI 5

Town

GENOVA

Postcode

16126

Country

Italy

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name UNIGE

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name Massimo

Last name Figari

E-Mail massimo.figari@unige.it

Position in org.

Professor in Marine Engineering

Department

DITEN

☐

Same as
organisation name

☐ Same as proposing organisation's address

Street

VIA OPERA PIA 11A

Town

GENOVA

Post code

16126

Country

Italy

Website

www.unige.it

Phone

+393358149240

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Lorenzo	Schiano di Pepe	lorenzo.schianodipepe@unige.it	+39 392 9890350
Davide	Giglio	davide.giglio@unige.it	+39 0103352553

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KU

PIC

999904422

Legal name

KLAIPEDOS UNIVERSITETAS

Short name: KU

Address of the organisation

Street Herkaus Manto 84

Town KLAIPEDA

Postcode 92294

Country Lithuania

Webpage www.ku.lt

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....31/07/2014 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KU

Department(s) carrying out the proposed work

Department 1

Department name Faculty of Marine Technologies and Natural Sciences, Department o

☐ not applicable

☐ Same as proposing organisation's address

Street Bijunu str. 17

Town Klaipeda

Postcode 91225

Country Lithuania

Department 2

Department name Marine Research Institute, Waterborne Transport and Air Pollution

☐ not applicable

☐ Same as proposing organisation's address

Street Universiteto al. 17

Town Klaipeda

Postcode 92294

Country Lithuania

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name KU

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name Vasilij

Last name Djackov

E-Mail vasilij.djackov@ku.lt

Position in org.

Associate professor

Department

Marine Engineering

☐

Same as
organisation name

☐ Same as proposing organisation's address

Street

Street Universiteto al. 17

Town

Klaipeda

Post code

Postcode

Country

Lithuania

Website

www.ku.lt

Phone

+37060941478

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Paulius	Rapalis	paulius.rapalis@ku.lt	+37062860541

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CERTH

PIC
998802502

Legal name
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS

Short name: CERTH

Address of the organisation

Street CHARILAOU THERMI ROAD 6 KM

Town THERMI THESSALONIKI

Postcode 57001

Country Greece

Webpage WWW.CERTH.GR

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....04/03/2009 - no

SME self-assessment unknown

SME validation sme.....04/03/2009 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CERTH

Department(s) carrying out the proposed work

Department 1

Department name Chemical Process & Energy Resources Institute

☐ not applicable

☒ Same as proposing organisation's address

Street CHARILAOU THERMI ROAD 6 KM

Town THERMI THESSALONIKI

Postcode 57001

Country Greece

Department 2

Department name Information Technologies Institute-Visual Computing Laboratory

☐ not applicable

☒ Same as proposing organisation's address

Street CHARILAOU THERMI ROAD 6 KM

Town THERMI THESSALONIKI

Postcode 57001

Country Greece

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CERTH

Department 3

Department name Hellenic Institute of Transport Institute

☐ not applicable

☒ Same as proposing organisation's address

Street CHARILAOU THERMI ROAD 6 KM

Town THERMI THESSALONIKI

Postcode 57001

Country Greece

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CERTH

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name Kosmas

Last name Dimitropoulos

E-Mail dimitrop@iti.gr

Position in org.

Researcher Grade C

Department

Information Technologies Institute - Visual Computing Laboratory

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

CHARILAOU THERMI ROAD 6 KM

Town

THERMI THESSALONIKI

Post code

57001

Country

Greece

Website

http://www.iti.gr

Phone

+302310464160(115)

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Grammalidis	Nikolaos	ngramm@iti.gr	+302310464160(112)
Petros	Daras	daras@iti.gr	+30 2311 257755
Adamis	Mitsotakis	adamis@certh.gr	+30 211 1069504
Georgia	Aifantopoulou	gea@certh.gr	+30 2310498451

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CNRS

PIC 999997930 **Legal name** CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

Short name: CNRS

Address of the organisation

Street RUE MICHEL ANGE 3

Town PARIS

Postcode 75794

Country France

Webpage www.cnrs.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....18/11/2008 - no

SME self-assessment unknown

SME validation sme.....18/11/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CNRS

Department(s) carrying out the proposed work

Department 1

Department name

GSMA UMR7331 CNRS

☐ not applicable

☐ Same as proposing organisation's address

Street

Moulin de la Housse

Town

REIMS

Postcode

51687

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CNRS

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Lilian

Last name JOLY

E-Mail lilian.joly@univ-reims.fr

Position in org.

Researcher

Department

GSMA

☐

Same as
organisation name

☐ Same as proposing organisation's address

Street

Moulin de la Housse

Town

REIMS

Post code

51687

Country

France

Website

www.cnrs.fr

Phone

+33383856421

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Jessica	NIETO	cjuste@dr6.cnrs.fr	+33383856421

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name HGG

PIC

911318687

Legal name

Hugo Grotius gGmbH - gemeinnützige Gesellschaft zur Förderung der Rechtswissenschaften

Short name: HGG

Address of the organisation

Street Parkallee 231

Town Bremen

Postcode 28213

Country Germany

Webpage www.hugo-grotius.de

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....09/10/2014 - yes

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name HGG

Department(s) carrying out the proposed work

Department 1

Department name Institute for the Law of the Sea and International Marine Environ

☐ not applicable

☒ Same as proposing organisation's address

Street Parkallee 231

Town Bremen

Postcode 28213

Country Germany

Department 2

Department name Institute for IT, Media and Intellectual Property Law (MLS LEGAL)

☐ not applicable

☒ Same as proposing organisation's address

Street Parkallee 231

Town Bremen

Postcode 28213

Country Germany

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name HGG

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name **Andree**

Last name **Kirchner**

E-Mail **kirchner@hugo-grotius.de**

Position in org.

Managing Director

Department

Hugo Grotius gGmbH - gemeinnützige Gesellschaft zur Förderung der Rechtswisse



Same as
organisation name

☒ Same as proposing organisation's address

Street

Parkallee 231

Town

Bremen

Post code

28213

Country

Germany

Website

www.hugo-grotius.de

Phone

+494213339391

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Iris	Kirchner-Freis	kirchner-freis@hugo-grotius.de	+494213339391

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name TAS

PIC

999908205

Legal name

THALES ALENIA SPACE FRANCE SAS

Short name: TAS

Address of the organisation

Street AVENUE JEAN FRANCOIS CHAMPOLLION 26

Town TOULOUSE

Postcode 31100

Country France

Webpage www.thalesaleniaspace.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....07/08/2008 - no

SME self-assessment unknown

SME validation sme.....07/08/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name TAS

Department(s) carrying out the proposed work

Department 1

Department name Business Line Observation Exploration & Navigation

☐ not applicable

☐ Same as proposing organisation's address

Street 26 Avenue Jean-Francois Champollion

Town Toulouse

Postcode 31037

Country France

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **101037019** Acronym **GREENING PORTS** Short name **TAS**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male ☐ Female

First name **Nicolas**

Last name **Dubyk**

E-Mail **nicolas.dubyk@thalesgroup.com**

Position in org.

Department

☐

Same as organisation name

☐ Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

Other contact persons

First Name	Last Name	E-mail	Phone
Marie	Desplas	marie.desplas@thalesalieniaspace.com	+335 34354757
Anne	ROUANET-LABE	anne.rouanet-labe@thalesalieniaspace.com	+335 34356394
Hanaa	Al BITA	hanaa.albitar@thalesalieniaspace.com	+335 34357759
Christiane	Notari	christiane.notari@thalesalieniaspace.com	+335 34355033

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name 3OC

PIC

894752057

Legal name

THREE O'CLOCK

Short name: 3OC

Address of the organisation

Street 145 RUE DE PELLEPORT

Town PARIS

Postcode 75020

Country France

Webpage www.threeoclock.co

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....27/03/2020 - yes

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name 30C

Department(s) carrying out the proposed work

Department 1

Department name

Public engagement

☐ not applicable

☒ Same as proposing organisation's address

Street

145 RUE DE PELLEPORT

Town

PARIS

Postcode

75020

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name 3OC

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex

☐ Male

☒ Female

First name Esti

Last name Sanvicente

E-Mail esti@threeoclock.co

Position in org. Innovation and service design manager

Department THREE O'CLOCK



Same as
organisation name

☒ Same as proposing organisation's address

Street 145 RUE DE PELLEPORT

Town PARIS

Post code 75020

Country France

Website www.threeoclock.co

Phone +33652744218

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Eva	Boo	eva@threeoclock.co	+33661124367

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name INVENT

PIC 892412902 Legal name Capgemini Consulting

Short name: INVENT

Address of the organisation

Street 147 quai du Pr?sident Roosevelt
Town Issy les Moulineaux
Postcode 92130
Country France
Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown Legal personyes
Non-profitunknown
International organisationunknown
International organisation of European interestunknown Industry (private for profit).....unknown
Secondary or Higher education establishmentunknown
Research organisationunknown

Enterprise Data

SME self-declared status..... unknown
SME self-assessment unknown
SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name INVENT

Department(s) carrying out the proposed work

Department 1

Department name

Citizen Services Department

☐ not applicable

☒ Same as proposing organisation's address

Street

147 quai du Pr?sident Roosevelt

Town

Issy les Moulineaux

Postcode

92130

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	
Same Group	CAPGEMINI TECHNOLOGY SERVICES	
Same Group	Capgemini DEMS France	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name INVENT

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Vincent

Last name Balandras

E-Mail vincent.balandras@capgemini.com

Position in org.

Vice President

Department

Citizen Services

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

147 quai du Pr?sident Roosevelt

Town

Issy les Moulineaux

Post code

92130

Country

France

Website

https://www.capgemini.com/fr-fr/

Phone

+33631007297

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Marianne	Boust	marianne.boust@capgemini.com	+33668447852
Jean-guillaume	Messmer	jean-guillaume.messmer@capgemini.com	+33157991984

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name DNV GL

PIC **Legal name**

917417271 DNV Italia srl

Short name: DNV GL

Address of the organisation

Street Via Energy Park, 14

Town Vimercate

Postcode 20871

Country Italy

Webpage www.dnvgl.it

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationyes

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name DNV GL

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

☒ not applicable

☐ Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name DNV GL

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Riccardo

Last name CASTIGLIONI

E-Mail riccardo.castiglioni@dnvgl.com

Position in org.

Marine Service Engineer

Department

DNV Italia srl



Same as
organisation name

☐ Same as proposing organisation's address

Street

Via Energy Park 14

Town

Vimercate (MB)

Post code

20871

Country

Italy

Website

www.dnvgl.it

Phone

+390396899905

Phone 2

+393487120064

Fax

+390396899930

Other contact persons

First Name	Last Name	E-mail	Phone
Andrea	Spessa	andrea.spessa@dnvgl.com	+393357631828

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name GSH

PIC

943294737

Legal name

GEOSYSTEMS HELLAS IT KAI EFARMOGESGEOPLIROFORIAKON SYSTIMATON ANONIMIETAIREIA

Short name: GSH

Address of the organisation

Street GKINOSATI 88A, METAMORFOSI

Town ATHINA

Postcode 14452

Country Greece

Webpage www.geosystems-hellas.gr

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2019 - yes

SME self-assessment31/12/2019 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name GSH

Department(s) carrying out the proposed work

Department 1

Department name

R & D

☐ not applicable

☒ Same as proposing organisation's address

Street

GKINOSATI 88A, METAMORFOSI

Town

ATHINA

Postcode

14452

Country

Greece

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name GSH

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex

☐ Male

☒ Female

First name Betty

Last name Charalampopoulou

E-Mail b.charalampopoulou@geosystems-hellas.gr

Position in org.

President & CEO

Department

R & D

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

GKINOSATI 88A, METAMORFOSI

Town

ATHINA

Post code

14452

Country

Greece

Website

www.geosystems-hellas.gr

Phone

+302102846144

Phone 2

+306974046410

Fax

+302117801508

Other contact persons

First Name	Last Name	E-mail	Phone
Christos	Kontopoulos	c.kontopoulos@geosystems-hellas.gr	+302102846145

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name DEMS

PIC 892475855 Legal name Capgemini DEMS France

Short name: DEMS

Address of the organisation

Street 145-151 Quai du Pr?sident Roosevelt
Town Issy-les-Moulineaux
Postcode 92130
Country France
Webpage www.capgemini.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno Legal personyes
Non-profitno
International organisationno
International organisation of European interestno
Secondary or Higher education establishmentno Industry (private for profit).....yes
Research organisationno

Enterprise Data

SME self-declared status.....28/03/2006 - no
SME self-assessment unknown
SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name DEMS

Department(s) carrying out the proposed work

Department 1

Department name

R&I department

☐ not applicable

☒ Same as proposing organisation's address

Street

145-151 Quai du Pr?sident Roosevelt

Town

Issy-les-Moulineaux

Postcode

92130

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	
Same Group	CAPGEMINI TECHNOLOGY SERVICES	
Same Group	Capgemini Consulting	
Same Group	Capgemini DEMS France	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name DEMS

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex

☐

Male

☒

Female

First name Anne-laure

Last name Cadene

E-Mail anne-laure.cadene@capgemini.com

Position in org.

Research & Innovation Director

Department

Research & Innovation

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

145-151 Quai du Pr?sident Roosevelt

Town

Issy-les-Moulineaux

Post code

92130

Country

France

Website

www.capgemini.com

Phone

+33668687725

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Fr?d?ric	BOUET	frederic.bouet@capgemini.com	+33763635165

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name AT

PIC 892880539 Legal name ALTRAN TECHNOLOGY & ENGINEERING CENTER

Short name: AT

Address of the organisation

Street 4, avenue Didier Daurat

Town BLAGNAC

Postcode 31700

Country France

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name AT

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

☒ not applicable

☐ Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **101037019** Acronym **GREENING PORTS** Short name **AT**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex

☐ Male

☒ Female

First name **Vilma**

Last name **Zotou**

E-Mail **vilma.zotou@altran.com**

Position in org.

EU Bid Manager

Department

ALTRAN TECHNOLOGY & ENGINEERING CENTER

☒

Same as
organisation name

☒ Same as proposing organisation's address

Street

4, avenue Didier Daurat

Town

BLAGNAC

Post code

31700

Country

France

Website

Phone

0698255130

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Arnold	Coppieters	arnold.coppieters@altran.com	+XXX XXXXXXXXXX
Sophie	REUCHE	sophie.reuche@altran.com	+XXX XXXXXXXXXX

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name FCT

PIC

906285454

Legal name

FACTUAL CONSULTING SL

Short name: FCT

Address of the organisation

Street JOSEP VALLS 13, 2ON A

Town SANT CUGAT DEL VALLES

Postcode 08195

Country Spain

Webpage www.factual-consulting.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2018 - yes

SME self-assessment31/12/2018 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS Short name FCT

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

☒ not applicable

☐ Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name FCT

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Marc

Last name F?guls

E-Mail marc@factual-consulting.com

Position in org.

Strategy Consultant

Department

FACTUAL CONSULTING SL



Same as
organisation name

☒ Same as proposing organisation's address

Street

JOSEP VALLS 13, 2ON A

Town

SANT CUGAT DEL VALLES

Post code

08195

Country

Spain

Website

www.factual-consulting.com

Phone

+34620005845

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Mart?	Jofre	marti@factual-consulting.com	+34675324747

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name ONAIR

PIC

952351142

Legal name

ON AIR S.R.L.

Short name: ONAIR

Address of the organisation

Street VIA CARLO BARABINO 26/4

Town GENOVA

Postcode 16129

Country Italy

Webpage www.onairweb.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2019 - yes

SME self-assessment31/12/2019 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name ONAIR

Department(s) carrying out the proposed work

Department 1

Department name Research Department

☐ not applicable

☒ Same as proposing organisation's address

Street VIA CARLO BARABINO 26/4

Town GENOVA

Postcode 16129

Country Italy

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name ONAIR

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name Ennio

Last name Ottaviani

E-Mail ennio.ottaviani@onairweb.com

Position in org.

Chief Technical Officer

Department

Research Department

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

VIA CARLO BARABINO 26/4

Town

GENOVA

Post code

16129

Country

Italy

Website

www.onairweb.com

Phone

+393483206619

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Maura	Mazzarello	maura.mazzarello@onairweb.com	+393482268600

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CTI

PIC

913776473

Legal name

CREOTECH INSTRUMENTS SPOLKA AKCYJNA

Short name: CTI

Address of the organisation

Street UL GEN LEOPOLDA OKULICKIEGO NR 7 LOK 9

Town PIASECZNO

Postcode 05 500

Country Poland

Webpage www.creotech.pl

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....11/02/2019 - yes

SME self-assessment31/12/2017 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CTI

Department(s) carrying out the proposed work

Department 1

Department name

Satellite Data Division

☐ not applicable

☒ Same as proposing organisation's address

Street

UL GEN LEOPOLDA OKULICKIEGO NR 7 LOK 9

Town

PIASECZNO

Postcode

05 500

Country

Poland

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name CTI

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name **Bernard**

Last name **MALE**

E-Mail **bernard.stepien@creotech.pl**

Position in org.

Business Development Manager

Department

Satellite Data Division

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

UL GEN LEOPOLDA OKULICKIEGO NR 7 LOK 9

Town

PIASECZNO

Post code

05 500

Country

Poland

Website

www.creotech.pl

Phone

+48789363155

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Jacek	Kosiec	jacek.kosiec@creotech.pl	+48601254069
Krzysztof	Myslakowski	krzysztof.myslakowski@creotech.pl	+48798079989

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SINAY

PIC

920603333

Legal name

SINAY

Short name: SINAY

Address of the organisation

Street 14 RUE ALFRED KASTLER

Town CAEN

Postcode 14000

Country France

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2018 - yes

SME self-assessment31/12/2018 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SINAY

Department(s) carrying out the proposed work

Department 1

Department name

Product Department

☐ not applicable

☒ Same as proposing organisation's address

Street

14 RUE ALFRED KASTLER

Town

CAEN

Postcode

14000

Country

France

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SINAY

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name David

Last name Lelouvier

E-Mail david.lelouvier@sinay.fr

Position in org.

Managing Director

Department

Product Department

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

14 RUE ALFRED KASTLER

Town

CAEN

Post code

14000

Country

France

Website

https://sinay.ai/fr/

Phone

+33677798784

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SIARQ

PIC

956609927

Legal name

STUDIO ITINERANTE ARQUITECTURA SL

Short name: SIARQ

Address of the organisation

Street AVENIDA DIAGONAL 523, 5-1

Town BARCELONA

Postcode 08029

Country Spain

Webpage www.siarq.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2018 - yes

SME self-assessment31/12/2018 - yes

SME validation sme.....15/05/2003 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SIARQ

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

☒ not applicable

☐ Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name SIARQ

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Alessandro

Last name Caviasca

E-Mail alessandro@siarq.com

Position in org.

CEO

Department

STUDIO ITINERANTE ARQUITECTURA SL

☒

Same as
organisation name

☒ Same as proposing organisation's address

Street

AVENIDA DIAGONAL 523, 5-1

Town

BARCELONA

Post code

08029

Country

Spain

Website

www.solarurbanhub.com, www.siarq.com

Phone

+34935533913

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Sarai	GARRIDO	sarai@siarq.net	+34935533913
Anna	Villanueva	anna@siarq.com	+34 935 533913

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name BSC

PIC

999655520

Legal name

BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION

Short name: BSC

Address of the organisation

Street Calle Jordi Girona 31

Town BARCELONA

Postcode 08034

Country Spain

Webpage www.bsc.es

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....01/03/2005 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name BSC

Department(s) carrying out the proposed work

Department 1

Department name

Earth Science Department

☐ not applicable

☐ Same as proposing organisation's address

Street

NEXUS II building, Jordi Girona 29

Town

Barcelona

Postcode

08034

Country

Spain

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name BSC

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☒ Male

☐ Female

First name **Albert**

Last name **Soret Miravet**

E-Mail **albert.soret@bsc.es**

Position in org.

Earth System Services Group Coordinator

Department

Earth Science Department

☐

Same as
organisation name

☐ Same as proposing organisation's address

Street

NEXUS II building, Jordi Girona 29

Town

Barcelona

Post code

08034

Country

Spain

Website

www.bsc.es

Phone

+34934134076

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Marc	Guevara Vilardell	marc.guevara@bsc.es	+XXX XXXXXXXXXX
Carlos Alberto	Gomez Gonzalez	carlos.gomez@bsc.es	+XXX XXXXXXXXXX
Mar	Rodriguez	mar.rodriguez@bsc.es	+34934137566

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name FBT

PIC

892084460

Legal name

Fine Bubble Technologies Sp. z o.o.

Short name: FBT

Address of the organisation

Street Okulickiego 7/9

Town Piaseczno

Postcode 05-500

Country Poland

Webpage www.finebubble.pl

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown

Legal personyes

Non-profitunknown

International organisationunknown

International organisation of European interestunknown

Industry (private for profit).....unknown

Secondary or Higher education establishmentunknown

Research organisationunknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name FBT

Department(s) carrying out the proposed work

Department 1

Department name

Research Department

☐ not applicable

☒ Same as proposing organisation's address

Street

Okulickiego 7/9

Town

Piaseczno

Postcode

05-500

Country

Poland

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name FBT

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name Jacek

Last name Kosiec

E-Mail jacek.kosiec@finebubble.pl

Position in org.

CEO

Department

Executive Board

☐

Same as
organisation name

☒ Same as proposing organisation's address

Street

Okulickiego 7/9

Town

Piaseczno

Post code

05-500

Country

Poland

Website

www.finebubble.pl

Phone

+48601254069

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Alicja	Matuszewska	alicja.matuszewska@finebubble.pl	+48608212618

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name WARTSILA

PIC

891896862

Legal name

W?RTSIL? VOYAGE LIMITED

Short name: WARTSILA

Address of the organisation

Street 13-18 City Quay

Town Dublin

Postcode

Country Ireland

Webpage www.wartsila.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown

Legal personyes

Non-profitunknown

International organisationunknown

International organisation of European interestunknown

Industry (private for profit).....unknown

Secondary or Higher education establishmentunknown

Research organisationunknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name WARTSILA

Department(s) carrying out the proposed work

Department 1

Department name

Simulation Department

☐ not applicable

☐ Same as proposing organisation's address

Street

13-18 City Quay

Town

Dublin

Postcode

D02 ED70

Country

Ireland

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID 101037019

Acronym

GREENING PORTS

Short name WARTSILA

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

☒ Male

☐ Female

First name **Filippo**

Last name **Menegato**

E-Mail **filippo.menegato@wartsila.com**

Position in org.

Sales Manager

Department

W?RTSIL? VOYAGE LIMITED



Same as
organisation name

☒ Same as proposing organisation's address

Street

13-18 City Quay

Town

Dublin

Post code

Country

Ireland

Website

www.wartsila.com

Phone

+393346898746

Phone 2

+XXX XXXXXXXXXX

Fax

+XXX XXXXXXXXXX

Other contact persons

First Name	Last Name	E-mail	Phone
Johan	Ekvall	johan.ekvall@wartsila.com	+46317695631

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS

3 - Budget

No	Participant	Countr y	(A) Direct personnel costs/€ ?	(B) Other direct costs/€ ?	(C) Direct costs of sub- contracting/€ ?	(D) Direct costs of providing financial support to third parties/€ ?	(E) Costs of inkind contributions not used on the beneficiary's premises/€ ?	(F) Indirect Costs / € (=0.25(A+B-E)) ?	(G) Special unit costs covering direct & indirect costs / € ?	(H) Total estimated eligible costs / € (=A+B+C+D +F+G) BENEFICIARY ?	(I) Reimburse- ment rate (%) BENEFICIARY ?	(J) Max.EU Contribution / € (=H*I) BENEFICIARY ?	(K) Costs of third parties linked to participant THIRD PARTIES ?	(L) Max.EU Contribution / € THIRD PARTIES ?	(M) Total Costs for BENEFICIARY & THIRD PARTIES (=H+K) ?	(N) Max.EU Contribution / € BENEFICIARY & THIRD PARTIES (=J+L) ?	(O) Requested EU Contribution / € BENEFICIARY & THIRD PARTIES ?
1	Cg	FR	1580535	79500	0	0	0	415008,75	0	2075043,75	70	1452530,63	0	0	2075043,75	1452530,63	1452530,63
2	Pga Sa	PL	877500	406000	1067000	0	0	320875,00	0	2671375,00	70	1869962,50	0	0	2671375,00	1869962,50	1869962,50
3	Kssa	LT	401200	43000	550000	0	0	111050,00	0	1105250,00	100	1105250,00	0	0	1105250,00	1105250,00	1105250,00
4	Pas	FR	924000	41000	0	0	0	241250,00	0	1206250,00	70	844375,00	0	0	1206250,00	844375,00	844375,00
5	Eurogate Ctl	CY	331800	15000	272000	0	0	86700,00	0	705500,00	70	493850,00	0	0	705500,00	493850,00	493850,00

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS

6	Cyi	CY	514000	27000	0	0	0	135250,00	0	676250,00	100	676250,00	0	0	676250,00	676250,00	676250,00
7	Unige	IT	1774500	19500	0	0	0	448500,00	0	2242500,00	100	2242500,00	97000	97000	2339500,00	2339500,00	2339500,00
8	Ku	LT	370500	17000	0	0	0	96875,00	0	484375,00	100	484375,00	0	0	484375,00	484375,00	484375,00
9	Certh	EL	454500	21750	0	0	0	119062,50	0	595312,50	100	595312,50	0	0	595312,50	595312,50	595312,50
10	Cnrs	FR	306998	32000	0	0	0	84749,50	0	423747,50	100	423747,50	0	0	423747,50	423747,50	423747,50
11	Hgg	DE	442000	10000	77600	0	0	113000,00	0	642600,00	100	642600,00	0	0	642600,00	642600,00	642600,00
12	Tas	FR	1189524	19500	0	0	0	302256,00	0	1511280,00	70	1057896,00	0	0	1511280,00	1057896,00	1057896,00
13	3oc	FR	385000	32000	0	0	0	104250,00	0	521250,00	70	364875,00	0	0	521250,00	364875,00	364875,00
14	Invent	FR	1485980	19500	0	0	0	376370,00	0	1881850,00	70	1317295,00	0	0	1881850,00	1317295,00	1317295,00
15	Dnv Gl	IT	283250	12000	0	0	0	73812,50	0	369062,50	70	258343,75	0	0	369062,50	258343,75	258343,75

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS

16	Gsh	EL	312800	12000	0	0	0	81200,00	0	406000,00	70	284200,00	0	0	406000,00	284200,00	284200,00
17	Dems	FR	621500	10000	0	0	0	157875,00	0	789375,00	70	552562,50	0	0	789375,00	552562,50	552562,50
18	At	FR	1641000	273500	0	0	0	478625,00	0	2393125,00	70	1675187,50	0	0	2393125,00	1675187,50	1675187,50
19	Fct	ES	356250	24000	0	0	0	95062,50	0	475312,50	70	332718,75	346875	242812	822187,50	575530,75	575530,75
20	Onair	IT	232000	12000	0	0	0	61000,00	0	305000,00	70	213500,00	0	0	305000,00	213500,00	213500,00
21	Cti	PL	276750	12000	0	0	0	72187,50	0	360937,50	70	252656,25	0	0	360937,50	252656,25	252656,25
22	Sinay	FR	448800	22000	0	0	0	117700,00	0	588500,00	70	411950,00	0	0	588500,00	411950,00	411950,00
23	Siarq	ES	279660	87000	0	0	0	91665,00	0	458325,00	70	320827,50	0	0	458325,00	320827,50	320827,50
24	Bsc	ES	297000	12000	0	0	0	77250,00	0	386250,00	100	386250,00	0	0	386250,00	386250,00	386250,00
25	Fbt	PL	132750	34000	4000	0	0	41687,50	0	212437,50	70	148706,25	0	0	212437,50	148706,25	148706,25

Proposal Submission Forms

Proposal ID 101037019 Acronym GREENING PORTS

26	Wartsila	IE	330000	10000	0	0	0	85000,00	0	425000,00	70	297500,00	0	0	425000,00	297500,00	297500,00
	Total		16249797	1303250	1970600	0	0	4388261,75	0	23911908,75		18705221,63	443875,00	339812,00	24355783,75	19045033,63	19045033,63

4 - Ethics

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs) ?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human embryos?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human foetal tissues / cells?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
2. HUMANS		Page
Does your research involve human participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve physical interventions on the study participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
3. HUMAN CELLS / TISSUES		Page
Does your research involve human cells or tissues (other than from Human Embryos/Foetuses, i.e. section 1)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
4. PERSONAL DATA		Page
Does your research involve personal data collection and/or processing?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
5. ANIMALS		Page
Does your research involve animals?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
6. THIRD COUNTRIES		Page
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
In case your research involves low and/or lower middle income countries , are any benefits-sharing actions planned?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Could the situation in the country put the individuals taking part in the research at risk?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
7. ENVIRONMENT & HEALTH and SAFETY		Page

Proposal Submission Forms

Proposal ID 101037019

Acronym GREENING PORTS

Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of elements that may cause harm to humans, including research staff?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
8. DUAL USE		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
10. MISUSE		Page
Does your research have the potential for misuse of research results?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
11. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	<input type="radio"/> Yes <input checked="" type="radio"/> No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents.



[How to Complete your Ethics Self-Assessment](#)

5 - Call-specific questions

Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default participate in the [Pilot on Open Research Data in Horizon 2020¹](#), which aims to improve and maximise access to and re-use of research data generated by actions.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a [Data Management Plan \(DMP\)](#), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.

☐ Yes

☒ No

Further guidance on open access and research data management is available on the participant portal:

http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm and in general annex L of the Work Programme.

¹ According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.



Greening Ports, act for an inclusive and sustainable future

Participant	Participant organisation name	short name	Country
1 (coord)	Capgemini Technology Services	CG	France
2	Port of Gdynia Authority S.A.	PGA SA	Poland
3	Klaipeda State Seaport Authority	KSSA	Lithuania
4	Port Autonome de Strasbourg	PAS	France
5	Eurogate Container Terminal Limassol limited	EUROGATE CTL	Cyprus
6	The Cyprus Institute	CyI	Cyprus
7	Genova University	UNIGE	Italy
8	Klaipeda University	KU	Lithuania
9	The Centre for Research & Technology, Hellas	CERTH	Greece
10	Centre National De La Recherche Scientifique Cnrs	CNRS	France
11	Hugo Grotius gGmbH	HGG	Germany
12	Thales Alenia Space France Sas	TAS	France
13	Three O'clock	3OC	France
14	Capgemini Consulting	INVENT	France
15	DNV GL Italia Srl	DNV GL	Italy
16	Geosystems Hellas	GSH	Greece
17	Capgemini Dams France	DEMS	France
18	Altran Technology & Engineering Center	AT	France
19	Factual Consulting Sl	FCT	Spain
20	On AIR S.R.L	ONAIR	Italy
21	Creotech Instruments	CTI	Poland
22	SINAY	SINAY	France
23	Studio Itinerante Arquitectura Sl	SIARQ	Spain
24	Barcelona Supercomputing Center	BSC	Spain
25	Fine Bubble Technologies Sp. Z O.O.	FBT	Poland
26	Wartsila Voyage Limited	WRS�	Ireland

For Table of Acronyms, please refer to annex 1 under Section 4-5

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1. Excellence

Historically, even with growing awareness of the climate change impact in ports, compliance with legislation remained the main driver for port authorities to consider initiating any form of green transformation. The awareness of ecological impact of ports and maritime transport has accelerated in the last 20 years and a number of projects (DocksTheFuture, PortForward, COREALIS, PORTOPIA, PIXEL, SAURON, DatPorts, LOGIMATIC, etc.), networks (EcoPorts, ESPO, IMO), policies and certificates (ISO 14001¹ and the European Eco-Management and Audit System (EMAS)², Port Environmental Review System (PERS)) have put the focus on the green transformation of ports.



Figure 1 Redesign of port infrastructure.

The battle against climate change has accelerated in 2020 in the context of the COVID crisis, with EU member states increasingly concerned by the resiliency of the European economy and by stepping up their climate ambitions. In October 2020³, the European Parliament voted binding obligation for the EU member states to reach **carbon neutrality by 2050**, which will have profound implications on all industrial sectors. Shipping emissions represent about 13% of overall EU transport GHG emissions⁴. Without further action, the sector's emissions are expected to grow by 50 to 250% by 2050. Air and noise pollution, impact on biodiversity and sulfur emissions add up to GHG emissions. Thus, ports and maritime sector are an important target to green the EU economy. It has become a political priority in European countries. For example, the recovery plan for the French economy post-COVID includes, an entire chapter devoted to the greening of ports. This political priority goes hand in hand with the

substantial financial resources offered by the member states to green port (200 million additional euros for France). At international level, the International Maritime Organization (IMO) has committed to **reduce greenhouse gas emissions (GHG) from international shipping by 50% by 2050**⁵. All this will have major implications in ports operations and logistics: ships will have to rely on **alternative fuel sources** (electric, hydrogen, natural gas, biofuels) and **ports infrastructures will have to be completely redesigned**, integrating charging stations, energy storage, connection with gas and power networks, etc (Figure 1). In this scenario, **digitalisation** will play a major role to optimize on-site logistics, reduce energy consumption and to manage future autonomous electric fleets.

However, although port greening services are rising, to our knowledge, none offers a complete, integrated, modular and "turnkey" such as our **GREENING PORTS** offer. If nearly all Europeans ports have included greening in their roadmap, few are still those who have taken concrete actions. It is the case of the port of Valencia or Rotterdam, but even if their solutions are promising, they are also *ad hoc* and appropriate for a large-sized port only. They are not designed to be replicable. To accelerate EU ports transition, a **fast replicability** of results is key, as it will enable a rapid adoption of the **GREENING PORTS** solutions. With this in mind, the strategy of the project relies on three (3) main pillars covering up to seven (7) demonstration actions of the call:

1. Medium-size ports (MPs) in widening zones as main target.

The main reasons are: 1) **flexibility**: they are more agile, with the possibility to test and adapt faster; 2) **faster impact**: they will provide more tangible and visible results because of their medium-scale environment; 3) **larger market**: between 10-50 million tons/year⁶, with an average turnover of 20M€/year. 4) **limited resources**: to ensure replicability with adapted business models. 5) **local economic boost**: MPs underpin local economy, ensure worthwhile employment opportunities and greatly assist towards local regeneration. To boost the widening zone ports transformation, the proposal has conveniently integrated 4 EU ports from Poland, Lithuania, Cyprus (new EU members admitted in 2004) and France with different characteristics and climate change impacts. Two ports



¹ <https://www.iso.org/standard/60857.html>

² https://ec.europa.eu/environment/emas/index_en.html

³ <https://www.europarl.europa.eu/news/en/press-room/20201002IPR88431/eu-climate-law-meets-want-to-increase-2030-emissions-reduction-target-to-60>

⁴ https://ec.europa.eu/clima/policies/transport/shipping_en

⁵ IMO action to reduce GHG emissions from international shipping. Accessible [online] [https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx#:~:text=IMO%20has%20adopted%20mandatory%20measures,Efficiency%20Management%20Plan%20\(SEEMP\)](https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx#:~:text=IMO%20has%20adopted%20mandatory%20measures,Efficiency%20Management%20Plan%20(SEEMP))

⁶ Small and medium sized ports as hubs for smart growth and sustainable connectivity. Accessible [online] http://archive.interreg4a-2mers.eu/2seas-files/page_ext_attachments/1602/PAC2_2SEAS_MAGAZINE_EN.pdf

are located in the Baltic Sea, one in Eastern Mediterranean Sea and one Rhine river.

- 1) **Gdynia (Lighthouse)**: 2nd seaport in the Baltic Sea, the Polish port is at the crossroad between Europe, Scandinavia and Asia.
- 2) **Klaipeda (fellow)**: unique Lithuanian seaport and the most northerly ice free in the Eastern part of the Baltic Sea (member of EcoPorts).
- 3) **Limassol (fellow)**: at the crossroad between the EU Middle East and Africa, main seaport of Cyprus island, the busiest port in the Eastern Mediterranean transit trade and touristic cruises.
- 4) **Strasbourg (fellow)**: 2nd inland French port, located in an Eurometropolis, strengthening attractiveness of the port and environmental impact.

GREENING PORTS will put them at the forefront of the green shift of medium ports.

2. Space-based technology to boost monitoring and impact assessment, ensuring accessibility to key analytics insights for public and private decision makers and steering strategic investments (incl. human workforce) towards services deployments. More precisely, space-based technology, data & services will enable 1) to identify which measures work the best to pivot services and business models quickly, and 2) to foster transferability/scalability to a maximum of EU ports. Here is the key to transform **GREENING PORTS** at scale considering the different specificities of each port in terms of localisation, environmental conditions, stakes and solutions to be scaled up.

3. A set of competitive/ready-to-be-implemented services provided by the best players in the market. The **GREENING PORTS** platform is presented to ports as a modular solution to be adapted to their needs and challenges. We have put together start-ups and SMEs (in the radar of the best innovation networks EIT Mobility, InnoEnergy) developing breakthrough technologies and large industrial groups (CG, AT, TAS, WSTL), bringing in its value chain coverage, industrial methodologies and the power to accelerate the scale-up of services in ports.

The **GREENING PORTS** proposal aims at strongly reducing and monitoring the GHG emissions, in line with the Paris Climate Agreement 2016⁷ and the UN Sustainable Development Goal 13 on Climate action⁸ and Goal 14⁹ by taking consequent actions in cross-related areas, naming energy-intensive industry, transport and resource efficiency, as well as land use and built environment, in a well-integrated way. The **GREENING PORTS** proposal will make a major contribution to GHG reduction by designing and building the green port of the future that will showcase Europe environmental leadership to the world and at the same time make European citizens proud to be pioneers.

1.1 Objectives

GREENING PORTS will co-create a new concept for the EU medium-size port making it a more liveable space, cleaning its air, improving its mobility, optimising its resource consumption and integrating citizens' voice in the whole process. These new multimodal hubs will drastically reduce GHG and other pollutant emissions produced by the maritime transport, adapting and scaling-up a set of new operational services. A digital platform will ensure impact monitoring to continuously support the ports' operations in the most sustainable way, beyond the lifetime of the project.

The **GREENING PORTS** proposal aims to put people and climate first, making ports more inclusive and resilient. It will be designed relying in the following competitive advantages 1) **businesswise**: will provide the means and state of the art technology for improving performance assessment on GHG emissions reduction and certification (PERS, ISO) strengthening the role of the **GREENING PORTS'** solution in the port market and rendering it as a tailor-made product with personalised instructions for port authorities, investors and port professionals; 2) **operational**: **GREENING PORTS'** solution will increase information transparency through regularly and dynamically measurements and interventions, assist port planning with more detailed information for cost-effective upgrading of the environmental performance and personalised instructions; 3) **technical**: **GREENING PORTS'** solution employs a variety of modules, APIs and interfaces, dashboards, decision-support tools, AI techniques and data analytics to design and implement the next-generation of tools to drive the green ports transition; 4) **inclusive**: **GREENING PORTS'** solution takes into account user's needs and requirements and provides user-friendly applications and services with enhanced user awareness.

⁷ The Paris Agreement : <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

⁸ United Nations' Sustainable Development Goals – SDG13 Climate Action: <https://sdgs.un.org/goals/goal13>

⁹ United Nations' Sustainable Development Goals – SDG14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development (<https://sdgs.un.org/goals/goal14>)⁴

The codesign process will be driven by **Port Taskforces** a multi-actor governance group including port stakeholders, public authorities, local communities, citizens, research and academia as well as private actors to ensure an inclusive and systemic approach where no one is left behind. It will provide operational solutions to the challenges and prioritising needs raised by each port. It will build dialogue in port's ecosystems engaging with 1) **local ports' experts and stakeholders**, 2) **citizens and civil society**; 3) **other EU and international** initiatives and H2020 projects 4) **Advisory Panel**, with international recognized experts in the field, 5) **other international ports** (see e.g. letters of support in section 4-5) bringing in their experience, feedback and lessons learnt to boost the transition.

The project puts together an alliance of key industrial players, top research organizations, private innovative actors, stakeholders and port authorities in a robust interdisciplinary consortium: four port authorities Gdynia (Poland), Klaipeda (Lithuania), Limassol (Cyprus), Strasbourg (France); industrial partners (CG, AT, TAS, WRSL); private and public partners with expertise in space-based information (CG, TAS, CREOTECH, GSH), in mobility (TAS, FACTUAL, ONAIR), in port operations (WRSL, SINAY, FBT), in energy (UNIGE, AT, SIARQ), research centres highly skilled in air quality and GHG monitoring and simulation (CNRS, CyI, BSC, KU), non-profit society for the law of the sea and environmental law (HGG), international standardization (DNV GL), a service design company specialised in citizen engagement (3OC), as well as a strategic consulting with strong expertise in ports and energy strategic roadmaps and digital transformation (INVENT).

In addition to the overarching objective, **GREENING PORTS** also intends to meet **seven specific operational objectives**.

GREENING PORTS Objectives	KPIs
<p><u>O1. Accelerate the transformation of the GREENING PORT lighthouse/fellows' ports into real-life Green ports (WP1/WP2/WP3/WP7)</u></p> <p>GREENING PORTS intends to transform the "lighthouse" port and the whole port ecosystem into a Green Port. The targeted high TRL solutions of our project are key to meet the objectives of the scalability of such a transformation. The "fellow" ports will follow suit to a certain extent, based on a combination of the selected solutions. To this end, GREENING PORTS will make extensive but careful use of the existing EU satellite-based solutions, sensors, IoT, drones and services. These valuable insights combined with the appropriate interpretation by AI techniques will particularly accelerate the transformation towards sustainable and smart ports and related ecosystems.</p>	<p>6 services codesigned and tested at TRL 7 in Lighthouse Port</p> <p>3 services co designed and tested at TRL 7 in each fellow ports</p> <p>15% reduction of GHG emissions in major port activities during the project duration</p> <p>1 EU Porthaton to solve identified problems in ports non addressed by the proposal (WP7)</p>
<p><u>O2. Empower port managers with the right tools and skills to ease green ports' transition (WP1/ WP3/ WP4)</u></p> <p>GREENING PORTS will put forward the creation of a digital dashboard delivering insights on Energy, Logistics & Mobility, and Environmental data in and around the ports. This dashboard will be co-designed with the ports, but potential features would be among others, the need for services' optimization, the smooth transition to alternative fuels and the monitoring and reduction of environmental impacts. Through a continuous enhancement of KPI collect and feedback, the dashboard will act as a decision support tool enabling the evaluation of the services, their improvement or adjustment along the way to empower ports to achieve social, economic, financial, and environmentally sustainable results. Capacity building activities (WP5, WP7) will ensure to map and train ports' managers with the right tools to ease the green transition, providing at the soonest, economical assessment of the best potential for services deployed.</p>	<p>Digital dashboard (WP4) with +20 KPI to monitor the transition (incl. Green Port performance index).</p> <p>3 Pilot ports to join EcoPorts (Klaipeda already member) and prepare the PERS certification</p> <p>4 capacity building activities for pilot ports employees (WP5/WP7)</p>
<p><u>O3. Integrate citizens' voice in the design of the new green ports concept (WP7)</u></p> <p>GREENING PORTS will demonstrate the positive impact of Green Ports to citizens. In particular, the project's activities will generate tangible results visible and understandable to citizens at short term. Citizen as part of the engaged stakeholders will contribute to the co-design phase of the operational services and solutions. Citizens' engagement will be ensured by putting in place, since the very beginning of GREENING PORTS, an effective</p>	<p>1 citizen observatory in each port location</p> <p>2 co-design workshops in each port location</p>

<p>stakeholders' engagement strategy. The strategy will include several steps so to guarantee a strong and effective communication with all stakeholders. The fact that GREENING PORTS encompasses medium-size ports justifies our intention to pragmatically work hand-in-hand in a small to medium size groups of stakeholders concerned. To this end, GREENING PORTS suggests the creation of a port Taskforce that will be a catalyst and decision-maker all along the cycle of the project.</p>	<p>1 capacity building activity to empower port employees with engagement techniques</p> <p>8 engagement campaigns</p>
<p><u>O4. Integrate space data and digitalisation to boost replicability of GREENING PORTS services (WP4)</u></p> <p>The GREENING PORTS will coherently mix the exponential volume of data coming from European Galileo and Copernicus Earth observation program (Sentinel-1, Sentinel-2, Sentinel-5p, Copernicus Atmospheric Monitoring Services), together with existing ports' operations data, cloud computing and AI technologies to build advanced insights and optimize port's operations and management.</p>	<p>A digital dashboard with: 6 features to monitor energy flow</p> <p>8 features for mobility and logistics</p> <p>5 features for environmental monitoring and impact</p>
<p><u>O5. Provide a Green Port's framework to boost trustable low emission services implementation (WP6)</u></p> <p>GREENING PORTS will provide the appropriate framework and guidelines to secure and maximise the effectiveness of low emissions services in ports. The assessment will consider legal, economic and financial aspects over a various segment of topics, from regulating polluting emissions at sea/port interface and green shipping, to GHG emissions/climate change regulatory and standardization frameworks. International level Assessments will be carried out (e.g International Maritime Organization, European Climate Law, European standardization in ports)</p>	<p>At least 4 policy/standards recommendations (ethical issues, technical and international standardization)</p> <p>Integration of PERS, ISO, EMAS within the design of the services and the dashboard</p>
<p><u>O6. To take the most of previous work, knowledge and expertise (WP0, WP5, WP7) to boost the green ports transition in terms of:</u></p> <p>Best practices – learning form the best: WP5 will review the ports that best perform in terms of digitalisation, logistics, data management, sustainability, etc. (agreements with the ports will be sought through the partners' network during the project) and will organise learning expeditions with pilot ports' employees. It will ensure the transferability of best practices.</p> <p>Clustering: (WP7) close collaboration with related EU projects to carry out joint activities, consultations, share of results. Exchanges with existing initiatives (ESPO, MedPorts, Helcom, ECG, aiVP, etc.) will be sought too.</p> <p>Experts network and International cooperation: An advisory board will be set at the beginning of the project and coordinated in WP0 to provide advice on the progress of the project and to ensure an external view.</p>	<p>4 learning expeditions (i.e. Rotterdam, Valencia, etc.)</p> <p>5 clustering meetings</p> <p>10 exchanges with existing initiatives</p> <p>At least 3 meetings with Advisory Board members</p>
<p><u>O7. To accelerate the adoption of GREENING PORTS services by other EU ports (WP5, WP6, WP7)</u></p> <p>Promotion: GREENING PORTS' impact will be enhanced by the promotion of the results of the scale-up of the developed services and by their sustainable replication beyond the Consortium ports. The proposal will boost the visibility of the GREENING PORTS solutions with different innovative activities: awareness campaigns, learning expeditions, portathons, bootcamps, open days and other events. Furthermore, EU deliverables will be vulgarised with infographics and short summaries for wider dissemination on social media.</p> <p>Certification & standards: Building on existing certificates and standards on the ports' management world is fundamental to ensure the uptake of the GREENING PORTS solutions. DNVGL will define standards at EU/International level for the implementation of green solution on ships (i.e. electric ships, hydrogen storage on board) and ports operations, and to enhance energy efficiency of ships. The project will integrate PERS, ISO and EMAS in the design and monitoring of the ports' activities.</p>	<p>8 awareness campaigns</p> <p>4 learning expeditions</p> <p>1 Portathon</p> <p>4 Open days</p> <p>1 Master plan template</p> <p>Integration of PERS, ISO, EMAS within the design of the services and the dashboard</p>

1.2 Relation to the work programme

Our proposal addresses the topic LC-GD-5-1-2020, particularly the scope and challenges for B) Green Ports. The project has been structured to fully address the scope of the topic, strictly adhering to the requirements of the call.

<i>Actions should perform large scale real life high TRL 6 or above demonstrations of sustainable maritime and inland ports</i>
Our project foresees breakthrough market innovative existing and promising solutions (TRL>6) with the implication of 10+ SMEs and 4 large industrial groups in the consortium in adapting the projects' services (WP2) for relevant port environment. Operational services' demonstrations in lighthouse/fellow ports (WP3) will cover services areas of energy, mobility and logistics, and environment and will be led by industrial partner (AT)
<i>Addressing the first aspect below: demonstrating integrated low-emission energy supply and production at ports (...) and supply systems (on-shore or off-shore), with storage, distribution and power/re-charging/sustainable alternative fuel re-fueling infrastructure(...);</i>
Based on the evolution of our partner's AT existing tool, GREENING PORTS is bringing a Multi Energy Hub distributing green electricity and storage/charger facility from solar panels and wind turbines production (lighthouse port) and from green hydrogen (fellow ports) (see section 1.3.1). It relies on a green hydrogen/renewable energy smart grid architecture that is adapted to ports' specificities, implemented by AT and UNIGE (WP2). Services demonstrations in lighthouse and fellow ports of sustainability beyond energy supply at ports and on shore supply system will be carried out (WP3) for hydrogen vessels, hydrogen locomotive for employees, hybrid driven workboat (on shore supply), stevedoring electrification, fuel workboat retrofit into green fuel, power charging station for scooters and electric light vehicles to connect port to city to limit car traffic inside the port and in the immediate vicinity of the port.
<i>And at least five of the following ones: 1) “Demonstrating sustainability and innovation beyond energy supply and demand at ports, particularly the integration with green and smart logistics and operations</i>
UNIGE and AT will coordinate activity demonstrations for services related to smart logistics operations and the analysis of their impact in terms of internal port logistics organisations in WP2 and WP3. Tools optimizing Port logistics operations planning, scheduled daily operations, decisions support system for port logistics operations are services which will be demonstrated in Lighthouse port with a target TRL7 (WP3)
<i>2) demonstrating seamless and highly efficient logistics operations for integrated connections</i>
UNIGE, CG, CERTH and FACTUAL will propose tools to improve and optimize the in and out port multi modal traffic. A dedicated service for port traffic flow optimization will be tested in Lighthouse port with a target TRL7 (WP3, WP4) to lower the saturation level of infrastructural connections between port and surrounding areas.
<i>3) “Performing pilot activities to showcase the positive environmental effects of digitalisation including EU satellite-based solution (...)”</i>
The acceleration of digitalization guided and supported by industrial partners CG and TAS, will demonstrate rapid environmental effects on optimized mobility, logistics and smart energy management (WP2,3,4). On top of this, our space-based solutions, fresh and reliable datasets and their integration in advanced modelling systems, will aim to contribute to the effectiveness of GHG emission reduction strategies. Our project demonstrates strong solutions based upon Copernicus EU Satellite for Earth observation Program (Sentinel 5p, Sentinel 2, Copernicus Atmospheric Monitoring Services), so to examine and better understand climate phenomena and prevent polluting episodes. In addition, precise localization system (European GALILEO and AIS enabled services) can also support societal resilience and facilitate smart technologies and services for various applications that reduce emissions, including green, safe and smart mobility.
<i>4) “Developing and promoting new multi actor governance arrangements that address the interactions between all port related stakeholders, including port authorities (...) to accelerate the production and use of sustainable energy”.</i>
GREENING PORTS will stimulate dialogue between the different port related stakeholders in our four pilot ports to identify the main challenges and problems and co-design the most adapted services for each of them (WP1,2,3). The project is contributing to a fair and inclusive transition to achieve climate neutrality by 2050 and will engage with local communities and citizens, through the citizen observatories (WP7). The ports' taskforces (WP1) will become the perfect arena to entail discussions on the ports' ecosystems to ensure the upscaling of innovative go-to-market solutions (WP5) and the engagement of all relevant stakeholders from cross-cutting sectors and industries (WP7).
<i>5) delivering new tools and optimization mechanisms for multimodal access, passenger and freight (..)</i>
GREENING PORTS will propose an on-demand transport tool (NEMI under Service 5) for the connection between port/city by FACTUAL (WP2). The on-demand service will provide a more inclusive, efficient and sustainable mobility for connecting the port with the city and it will integrate the port in the urban mobility, for

employees and travelers based in a technological platform that allows users to book their virtual seat in the more convenient pick-up point and timetable for the daily journey to the workplace, to the city centre or to a transport hub. The on-demand services are user-centric and could make a revolution on the mobility that connects port infrastructure with the city will be tested in Lighthouse (**WP3,4**). The service offers micro-subsidy calculation engine for promoting sustainable mode of transport a) Economic discounts for port workforce transport b) Micro-subsidies for users that their destination is a transport hub as it will promote the multimodal mobility; and c) Boost inclusive and sustainable mobility by providing economic support to vulnerable-to-exclusion groups such as seniors and/or disabled (but independent) users

6) assessing non technological framework conditions such as market mechanisms and potential regulatory actions (...)

Legal, economic, and standardizations framework conditions are one of the key challenges to be addressed to succeed in the inclusive sustainability at long term. **WP6** considers simultaneously the different legal, economic as well as standardization frameworks. Relying in the analysis of the existing legal framework from a public international and EU law perspective is the first step to achieve fair transition to a greener model of shipping with special attention to the ship/port interaction.

7) delivering a Master Plan for the future Green Port with a bold vision and roadmap (...)

Based on seamless assessment of the GREENING PORTS technical solution (**WP2,3,4**) and a detailed study of its outputs and impact assessment (**WP4**), an itemized list of assets for Replicability and Reproducibility will be produced including the Greening Port Master Plan (**WP5**). This cornerstone deliverable will include a plan for the future Green Port, with the vision and a roadmap with milestones to achieve GHG neutral shipping and minimal pollution in maritime and inland port areas also supporting 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; Master plan's objective is to clarify how GREENING PORTS existing and new products-solutions integrated within the project multi-lab collaborations, will increase the quality of services and information provided, allowing a more in depth analysis and definition of GREENING PORTS roadmaps.

Incorporate field performance monitoring with a view to assessing the effectiveness of deployable solution (...)
Actions should also provide a quantified assessment of the expected improvement in port energy consumption, greenhouse emissions and air quality.

WP4 is dedicated to set up a supervision system, assessing the quantitative impact of the greening ports transformation. **GREENING PORTS** "Dashboard" under **WP4** will be able to provide actionable insights for decision support in port authorities, by measuring the real time KPIs of the services implemented in ports, implementing monitoring solutions, investigating actions to help decision-making. To ensure real time adaptation for port authority to meet their GHG emissions reduction, the impact assessment is centered around three perspectives: 1) Environmental parameters (monitored before/after the implementation of mitigation measures to provide ground-truth verification of GHG and Air Pollution emission reduction) 2) Mobility flows 3) Energy efficiency impact assessment and enhancement. The dashboard will also help to face actual challenges to design and implement sustainability transition and will provide midterm scenarios (2030, 2040, 2050)

1.3 Concept and Methodology

1.3.1 Concept

GREENING PORTS will ultimately contribute towards the Green Shift for the maritime sector as noted by the European Green Deal¹⁰ Strategy, by delivering: **Master Plan Strategy, Modular low carbon Services and Green Transformation Dashboard**. To date, there is no equivalent to this Master Plan, supported with services and a dashboard in terms of scope, underlying analysis, targets and audience it intends to reach. A new port, would have the possibility to choose the different **GREENING PORTS** solutions in a modular manner, adapting thus the offer to the different ports' specificities, as we consider that one solution does not fit to all. Different business models and implementation cases will be studied for each solution.

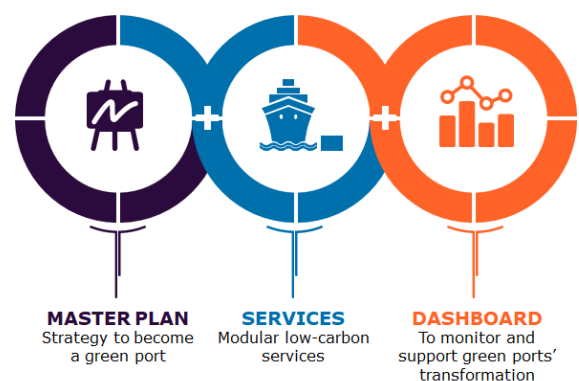


Figure 2 Greening Ports proposed solutions

GREENING PORTS' aims at creating a new framework for ports relying on the following concepts:



Figure 3: *GREENING PORTS'* concept

Inclusive, co-designing the new ports' concept with citizens. By including citizens' voice into the design of new port services, the **GREENING PORTS** proposal will ensure the creation of inclusive transport infrastructures, targeting environmentally friendly large public spaces, dedicated open air recreational areas, etc. The proposal will create citizen observatories in the four ports to identify the main problems that citizens encounter within ports infrastructure, energy, mobility, etc. and that could be solved with the **GREENING PORTS** services or the Porthathon, to use open innovation to solve citizen local problems. Co-design will also ensure to get direct feedback and enhanced acceptability in the testing of the solutions, from the technical and the business model point of view.

Cooperation, new governance structures through Ports' Taskforces to ensure a systemic approach of the shift. The co-building and the innovative multi governance are a cross-cutting approach to guide the real implementation of **GREENING PORTS** in the lighthouse port and fellow ports. The ports' taskforce is a working group, which aims at ensuring the proper implementation of the services and accelerating the demonstration. The taskforce will ensure relevant stakeholders' involvement of the Port Ecosystem including government, local communities, private actors and research/academia (Quadruple Helix approach). The Port Taskforce will adopt a systemic approach dealing with 1) **Digital Services** (CG) 2) **Energy Services** (UNIGE) 3) **Mobility and Logistics Services** (Factual) 4) **Environmental Services** (CyI) 5) **Citizen Participatory Approach** (3oC). The taskforces will enhance cooperation and coordination among the different port stakeholders. They will also provide recommendations and best practices for real-world implementation and testing of the services. Taskforce governance is fully described in the Section 3. Implementation.

Space data: bringing space data to non-space port ecosystem opening new opportunities. Space applications, including European Earth Observation (EO) and European Global Navigation Satellite Systems (GNSS) applications and technologies, are used in a wide range of applications covering land, marine and atmosphere monitoring. GNSS based solutions (Galileo) are currently used in port areas for precise location-based applications. The exponential volume of data coming from Copernicus Earth observation program (Sentinel 2, Sentinel 5p, Copernicus Atmospheric Monitoring Services), combined with integrated cloud computing solutions and AI technologies, opens up interesting opportunities for ports by mixing this with their own data sets. Climate change has a wide range of impacts on ports management, such as rising sea levels, and a higher occurrence of extreme weather events responsible for an increased risk of flood, drought, heat waves and pollution episodes that affect the port activity. To tackle this, **GREENING PORTS** gathers European key players in the space gameboard (TAS, GSH, CTI, CG, CERTH) to delivery on top of insights for mobility and logistics, top innovative insights for pollutant footprint from space, such as CO₂ mixing ratios, real time NO₂ emissions, water quality indicators, green index, water surface monitoring (oil spill and marine plastic litter detection).

Digital, the catalyst to support the transition to become green, inclusive and profitable ports. Ports' ecosystems are subject to fast-changing factors: passenger growth, increase in freight transport, new and complex technologies, regulation policies at local, national and EU level, etc. all of them impacting the daily operations of ports and thus shaping its future. In these context, digital technologies are a key asset to support the optimization of ports' operations and to achieve rapidly a high positive environmental impact on air quality and GHG emissions and on energy consumption with further capacity to be rapidly duplicated.

Real time monitoring: Amplify operational capacity and decision making. Port stakeholders are not familiar with the Earth Observation-based applications (Copernicus program among others), while Earth Observation downstream market is undergoing strong changes in business models towards near real time applications. Having the appropriate data for evidence-based decisions making is essential. With the view of addressing the effectiveness of deployable solutions, GREENING PORTS proposes to set up a monitoring Dashboard, allowing port authorities to set objectives and to get a quantified assessment of the improvement in real time, to enable them to make informed decision making, based on explainable AI (xAI) approaches. GREENING PORTS will assess, provide alerts to users when needed, and adapt operations in real time, allowing modifications when deviations from KPIs occur. The “Dashboard” will consider different projections, by developing prediction models and scenarios to deal with different types of challenges, including special requirements of post COVID-19 era. To maximize the impact and facilitate its adoption by other European ports, the Dashboard will be integrated into the WEKEO DIAS¹¹ platform.

Green Energy shift to reduce GHG waterborne transport. GREENING PORTS will aim at identifying the services with the greatest impact and most immediate remediation effects: having a comprehensive review of energy and waste consumption, greening energy supply, develop electric mobility solutions for on-site ports, replace diesel gensets for vessels that are stationing at ports, etc. GREENING PORTS put the Ports at the heart of the green shift and will integrate existing certifications (PERS, ISO, EMAS) to ensure the uptake.

GREENING PORTS’ Technical Architecture

To make the GREENING PORTS concept a reality, the proposal organizes its core modular functions into the technical architecture illustrated in Figure 4. The schema is presented and described from bottom to top.

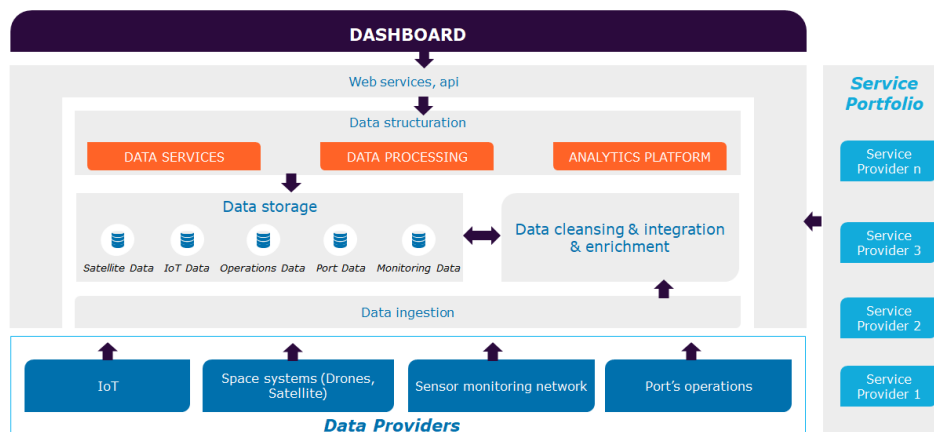
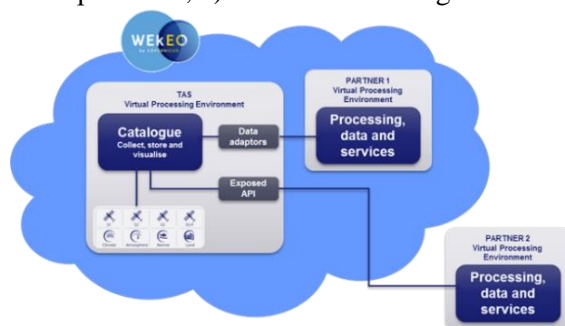


Figure 4: GREENING PORTS Technical Architecture

1 Data providers: Leveraging a maximum of data to build the services. The services related to GREENING PORTS leverage a wide variety of data from different sources: 1) Ports’ operations, 2) Sensor Monitoring Networks, 3) Drones and Satellites remote sensing, 4) IoT and all using cloud computing solutions to ease collaboration.

The GREENING PORTS platform will be based on the EU DIAS cloud WEKEO, allowing fast replicability and using EU infrastructure. Two levels of integration are available, the first one is the data through connectors provided by GREENING PORTS and the second is the service using Application Programming Interface (API) from the platform to integrate external services. These services are free to use their own infrastructures or use fully the GREENING PORTS platform including the processing.



2 Data Layer including:

- **Data Ingestion.** This layer implements the connectors to collect data from the different data providers.
- **Data Cleansing & Integration & Enrichment:** this layer implements functions for data integration after, in some cases, data cleansing and enrichment.
- **Data Storage:** this layer stores data and make it available for data structuration layer.
- **Data Structuration:** this layer encompasses all functions that prepare or process data for visualization.

¹¹ DIAS stands for Data Information Access Services is an initiative launched by the European Commission to provide a single access point to all Copernicus data and information alongside processing resources, tools and other relevant data.

- **API/Web services:** to be used by the visualization layer using the data. This includes both services implemented directly by the “Green Port” platform and other services providers.

3. Dashboard: Data visualization: this layer is the user interface and presents all information related to the monitoring of the different modules in ports. It is a supervision system that will facilitate faster reliable decision, making by summarizing all the crucial data for ports’ authorities. It will be accessible everywhere (cloud infrastructure) and it will 1) Aggregate on the same platform several kinds of data and facilitate access to impact indicators related to operational services; 2) Provide immediately the overall status of the KPIs information. It will enable the real time quantitative impact assessment in terms of mobility, environment and energy efficiency. The effectiveness of the deployed services in Lighthouse and Fellow ports is possible by measuring the KPIs of the services implemented in ports, implementing monitoring solutions and providing adaptative/corrective actions to enhance services.

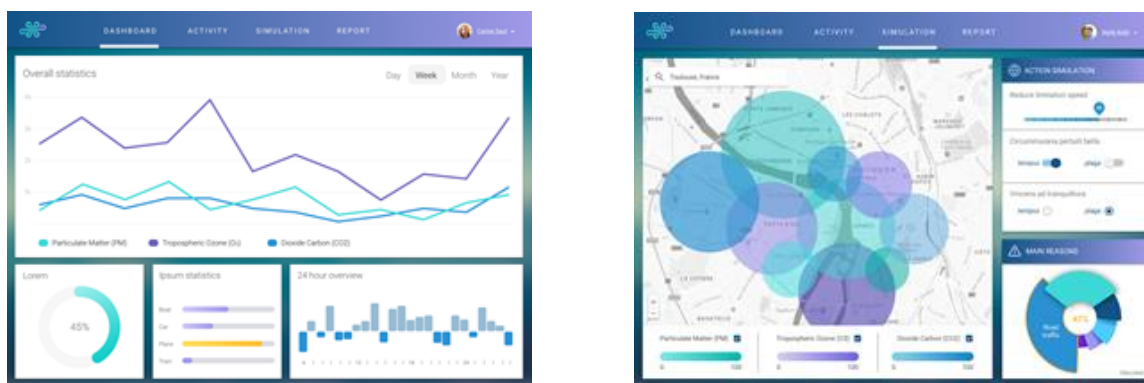


Figure 5: Mock-up for the GREENING PORTS Dashboard

4. Services portfolio. GREENING PORTS proposes a full panel of services addressing the most important challenges and pain points ports are facing today. They are structured in three (3) service areas: 1) Energy 2) Mobility and Logistics 3) Environmental services. They are detailed hereafter indicating partners involved in its development. As the co-design of services will be implemented during the project, services might be subject to change to adapt to local specificities and citizens problems. The GREENING PORTS will ensure this flexibility to better adapt and respond to each port characteristics.

Table 1: List of GREENING PORTS services

Greening ports' services	Short Description	Ports' pain points & challenges
Service Area: Energy		
Service 1: Low Carbon Energy Services	Assess the potential of the new technologies for clean energy production, storage and energy demand and supply	CO2 and Air Pollutant emissions Energy dependence
Service 2: Green Port Energy Simulation Services	Evaluates the effectiveness or minimise energy consumption	CO2 emissions, Energy dependence, Port and Ships operations more efficient
Service Area: Mobility and Logistics		
Service 3: Green Smart Logistics	Optimise logistics operations for ships and port operations Impacts analysis in terms of internal port logistics organisation and related KPIs	Traffic Energy dependence
Service 4: Seamless and efficient logistics operations Services	Provides solutions, and tools for smoothening the in- and out- port multi-modal traffic.	CO2 emissions, port's operations congestion
Service 5: Tools for multimodal and efficient access Services	better connection between port area and city and traffic reduction from/to the port	City/Port modal shift Mobility access
Service Area: Environment		
Service 6: Environmental Monitoring Services	A suite of technologies solution enabling monitoring positive impact of energy/mobility	CO2 emissions Air Quality Noise Water Quality

Service Area: Energy

Service 1: Low Carbon Energy Services (ALTRAN, UNIGE, KU, CERTH, SIARQ)

The aim of this service is to assess the actual situation of the different port energy conditions (energy audit) and assess the potential of the new technologies. The services will cover 1) **low carbon energy production and storage using a Multi Energy Hub** approach as depicted in Figure 5. Green electricity will be produced by using renewable energies available in ports: solar, wind, and marine (wave, current, thermal and osmotic) power. 2) **low carbon energy supply and demand**: the energy produced by this hub can be stored with batteries and be used to charge electric vehicles like scooters, bikes, light weight vehicles, drones and other devices and meet the electrical demand of mobility and logistics in Ports. Low carbon fuels can also be used (hydrogen, ammonia, biofuels) and locally produce (electrolyser). The service will also focus on energy efficiency buildings via heating and cooling systems and energy monitoring for energy management. Cold ironing on shore power source and innovative barge is proposed from electric network or hydrogen mobile units. All these technologies will be implemented in a decision support system for supporting to the decision and conception of a low carbon energy grid in each port (accessible from dashboard).

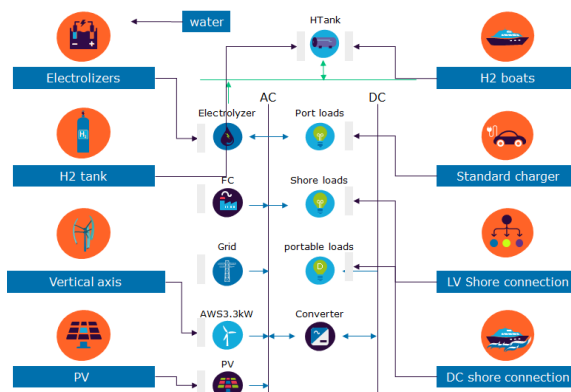


Figure 6: Scalable Multi Energy Hub Production and Supply

Service 2: Green Port Energy Simulation Services (UNIGE, DNV GL, ONAIR)

The services address **the effectiveness of the port decision strategies** to minimize energy consumption with reference to ships/boats traffic scheduling and routing, ship-shore connection and shore-based consumers. The service is based on a two-level strategy: a vessel-specific routing tool based on minimization of CO2 emissions and an energy management tool capable to integrate and optimize shore and ship based energy consumptions/production. The tools act as a decision support system using simulation to quantify ships environmental KPIs will prove and quantify the benefits of a continuous energy management of port activities and vessel dynamic scheduling in order to quickly adapt the planning of port operations to a modified scenario. The service also will support the long-term sustainability greening ports solutions through availability and supportability simulations. Those analysis will be used to select the best possible pieces of equipment related to Service 1, considering a tradeoff between acquisition efforts and operational efforts.

Service Area: Mobility and Logistics:

Service 3: Green Smart Logistics Services (UNIGE, SINAY, CG, CERTH) Services will cover three aspects: 1) **Simulation and optimisation of port logistics operations** with an operational, economic and social assessment for the introduction of smart logistics tools; 2) **Impact of smart contracts in the different ports operations** with guidelines for increasing effectiveness of smart contracts usage; 3) **Smart business models assessing the real impact** on the day to day operations generated by new technologies introduction through a technology acceptance evaluation. The tool will be tested in Lighthouse port Gdynia.

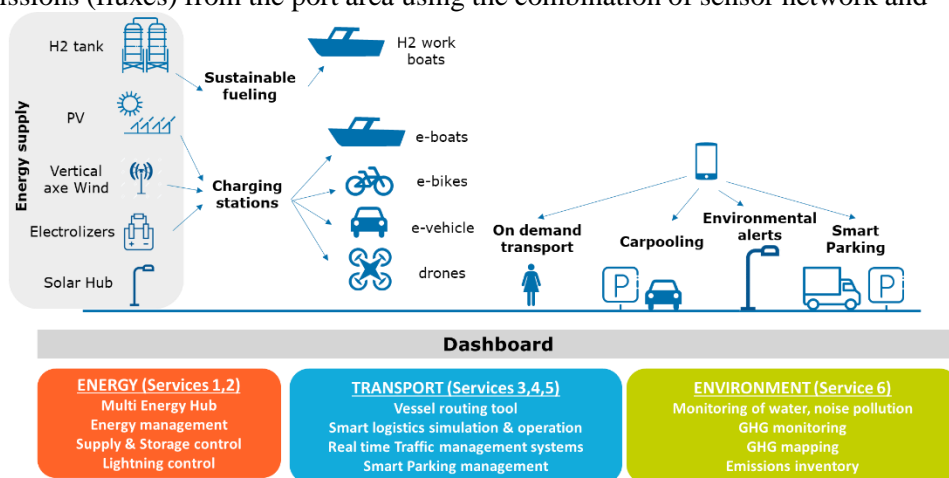
Service 4: Seamless and efficient logistics operations Services (UNIGE, SINAY, CG, CERTH, FCT) Assessments will be delivered, in order to assess global costs, challenges, and advantages of different solutions and to implement 1) **traffic management system capable of optimizing different transport and logistics solutions**. 2) **to plan a smooth future implementation of the proposed solutions** and to evaluate operational and economic impacts of the technology implementation. 3) **to provide traffic management system (TMS) with status in real time** of the connections between port and cities/towns and between port and other freight terminals and the status of freight flows in and out of the port, and calculates the related performance indicators. The final service will provide a specific traffic management system tool capable of optimizing multimodal traffic flows and to promote synchro-modality (TRL6).

Service 5: Tools for multimodal and efficient access (FCT, OnAir) The service will provide innovative solution for 1) **on demand sustainable transport service** from and to the city, aiming to increase the efficiency of the public transport. In addition, innovative evolution will be developed by plugging a micro subsidy calculation engine by promoting sustainable trips. 2) **development of smart park zones for trucks**, delimited by signs with Bluetooth and controlled with a mobile app for specific target of vehicle or driver profiles.

Service Area: Environment

Service 6: Environmental Monitoring Services (CyI, BSC, CERTH, SINAY, SIARQ, UNIGE, CTI, KU, CNRS) The services will provide monitoring of 1) **Water pollution** -plastic, oil spill and leakage 2) **Noise Pollution** through sensor and model-based active mapping within or around a port facility 3) **Air Quality** improving the quality

level of cost-effective services related to the real-time monitoring of EU-regulated air pollutant concentrations in the Port area for public information and in support of stakeholders to monitor the efficiency of mitigation measures on local Air Quality.**4) Air pollution and GHG emission mapping** testing and validating new services providing diagnostic maps with high spatial and temporal resolution of air pollutants and greenhouse gases hotspots using state-of-the-art remote sensing (LIDAR) and mobile platforms (UAVs, mobile van). **5) Air Pollution and GHG emission control and inventory** providing new services to control ship emissions (with UAV-based technique) and to provide long-term monitoring of the CO2 emissions (fluxes) from the port area using the combination of sensor network and inverse modelling. This sub-task will also further adapt to port emissions a recently developed bottom-up High-Resolution Modelling Emission System as a unique tool to estimate air pollution/greenhouse gases emissions from each port sector and test the efficiency of various mitigation scenarios.



An overall overview of the solutions provided by GREENING PORTS is illustrated in Figure 7

Figure 7: GREENING PORTS services provided

GREENING PORTS Master Plan

Part of the services, the Master Plan will be elaborated for each port of our Consortium. The Master plan is the vision of the future Green Port, with milestones to achieve GHG neutral shipping and minimal pollution in maritime and inland port areas. It also supports a wider socio-economic perspective, covering sustainable & smart mobility, technical, operational, economic, environmental & 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.

GREENING PORTS Business model

GREENING PORTS will explore four innovative business models in the four pilot ports with different configurations (see figure below and section 2.2 exploitation for more information).



Figure 8: BM to be implemented and tested for GREENING PORTS solutions

Different options such as reducing or eliminating the need of upfront capital investment, lowering financial risk for investors or performance contracts will be studied and tested in the pilot ports to get feedback on willingness to pay and on the whole service structure. Other options as yearly subscription or pay-as-you-go services will also be integrated in the analysis.

1.3.2 Technology Readiness Level (TRL) and positioning of Greening Ports

The GREENING PORTS Consortium believes that in order to maximize the impact and the exploitation of the demonstrated services, those services shall be developed at a very high TRL. The success key to perform tangible results visible at short term to citizens is the level of the maturity of the services to be deployed in the ports. To tackle the pains points and challenges of the Port, the “Lighthouse” port will demonstrate the deployment of novel solutions, both hardware and software services developed via the project’s activities. “Fellow” ports 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 be committed to implement the results produced by the project and best practices identified. For medium cost sensors network from SIARQ and SINAY, at already TRL 9, GREENING PORTS will

improve accuracy of their networks by validation against reference instrument provided by research partners (CyI, CNRS).

Services	Exist TRL	Target TRL	How GREENING PORTS will do it
Service 1	6	7	Resilient solution, availability and maintainability simulations LCE Systems designed, assessed and tested in significant simulated environment. Run with simulated data and checking efficiency and TRL6. Identification of port situations that match with LCE systems and applications. Power balances on some production/consumption systems will drive the choice for adaptation of identified TRL6 LCE systems. Study interfaces and tie-ins between LCE systems and the port utilities and infrastructures. Commissioning activities. Demonstration of LCE systems and applications adapted to the port environment, tests run to validate TRL7.
Service 2	6	7	Systemic approach and Technology Acceptance Model Availability Simulation
Service 3	6	7	Large set of macroscopic and microscopic traffic models and smart tools, and demonstration on lighthouse port.
Service 4	6	9	Platform tailored for two ports and innovative evolutions for smart park zone and multimodal efficient access tool
Service 5	6	9	Resilient solution, Availability & Maintainability simulations
Service 6	6	8	Adaptation and deployment of a comprehensive suite of existing environmental monitoring solutions and models
Dashboard WeKEO	6	9	The WeKEO Cloud platform is operational. It will be enriched with a unified model of data aggregation and presentation for the specific needs of GREENING PORTS. It will propose API and host third-party services for high replicability.

1.3.3 Related Research & Innovation activities

This section highlights regional and international projects that consortium members participate and relevant to the call.

Table 2: Examples of partners' projects which GREENING PORTS draws upon

Project and Call	Contribution to GREENING PORTS project	Who
H2020 Poseidon MED II	Best practices from Greek and Cypriot ports	CERTH GSH
COMPLETE and COMODALCE INTERREG	Best practices on biodiversity impact in the Baltic Sea region and how to reduce risk of invasive species introduction by shipping	GPA
COREALIS MG 7-3 2017	For a better knowledge of environmental and societal footprint of the ports, Partner in advisory board	GSH,
CEF Transport 2018 "Connecting Europe"	Feasibility study with technical documentation on the intelligent truck management system at the Port of Gdynia	GPA
ENDURUNS H2020 project	Benefit from demonstration of a long-endurance sea surveying autonomous unmanned vehicle with gliding capability powered by hydrogen fuel cell.	KSSA
GREEN CRUISE INTERREG Central Europe	Best practises of the promotion of investments to ecological and environmentally infrastructure of the Baltic Sea region cruise seaports.	KSSA
CORRIDOR II INTERREG Central Europe	to develop East-West Transport Corridor as an effective "green" corridor corresponding to the demands of growing cargo flow transportation.	KSSA
HAZARD INTERREG Central Europe 2014-2020	To develop and implement an information system for control of dangerous and polluting cargo.	KSSA
RPIS INTERREG 2019 2022	Port community system for Upper Rhine Ports	PAS
EMME-CARE H2020 (2019-2026)	Research and Innovation excellence on Air Pollution and Climate Change.	CyI
MarTERA ERA-NET MATE (2020-2023)	A monitoring network for Maritime Traffic Emission (MATE)	CyI
Docks The Future H2020-MG-2017	Recommendations on the concept of "Port of the Future" for simplifying and digitizing procedures and processes for port operations and logistics	UNIGE

DREEM-LC-GV-2020	Better understanding of citizen engagement and communication in pilots for micro mobility in different EU countries	3OC
CHEK H2020 2021-2024	Best practices on technologies to be demonstrated at full scale on vessel concept designs based on real operational profiles	WRS�
BALT SAFE (January 2019 - December 2021)	Following HELCOM recommendation, benefit from Sea Traffic Management (STM) to tanker traffic in the Baltic Sea.	WRS�
ECOSHIP simulator (on going)	Lessons learnt from simulator for monitoring fuel consumption and emissions developed for Rorvik Safety Cener in Norway	WRS�
PIXEL MG-7-3-2017	References on IoT based Port scalable solution for environmental impact. Port Enviromental Index	CERTH

1.3.4 Methodology

To meet with scalability/adaptability objectives of the project, the proposed methodology is inspired by SAFe¹² (scaled agile) and will be tailored for **GREENING PORTS** project. Indeed, SAFe will be applied for Port Services Portfolio Management (WP2), Agile Services Delivery and Increment Objectives. The **GREENING PORTS** Services Portfolio Management aligns strategy and execution by applying Lean and systems thinking approaches. Portfolio is managed as a collection of Value Streams (our Service Areas) for Ports engaged in green transformation. Each value stream delivers one or more solutions supporting the Port to meet its greening strategy. The approach includes in particular: 1) Lean port cases with Minimum Viable Product (MVP), environmental outcome hypothesis, agile forecasting and estimating 2) Environmental objectives measures & milestones based on working services. As new assessment is learned by WP4 about the solution set, including key performance metrics, project periodically reviews the portfolio canvas (e.g., quarterly) and explores different scenarios. Partners will follow architectural principles and practices that enable the evolution and replication of its solution set. Enterprise Architect promotes adaptive design, engineering practices, reuse of components and proven patterns across portfolio, and helps improve results by fostering Architectural Runway and offering architectural governance for WP2, WP3 and WP4. Agile Services Delivery is a Port-centric approach to defining, building, and releasing a continuous flow of valuable products and services to ports authorities and citizens as users. To ensure the port is creating the right solutions for the right users at the right time, they will have to balance their execution with a user focus. These capabilities are mutually supportive and create opportunities for an inclusive and sustainable transformation. DevOps is also used to accelerate deployment and decision making based on resulting KPIs. Program Increment (PI) will allow Port Demonstrations throughout the project. PI Objectives are a summary of the environmental and technical goals to achieve in the upcoming PI. During PI Planning, teams create PI objectives, which are the services to showcase in the upcoming PI. Based upon three pillars described hereafter, **GREENING PORTS** approach will be declined over the lighthouse and fellow ports.

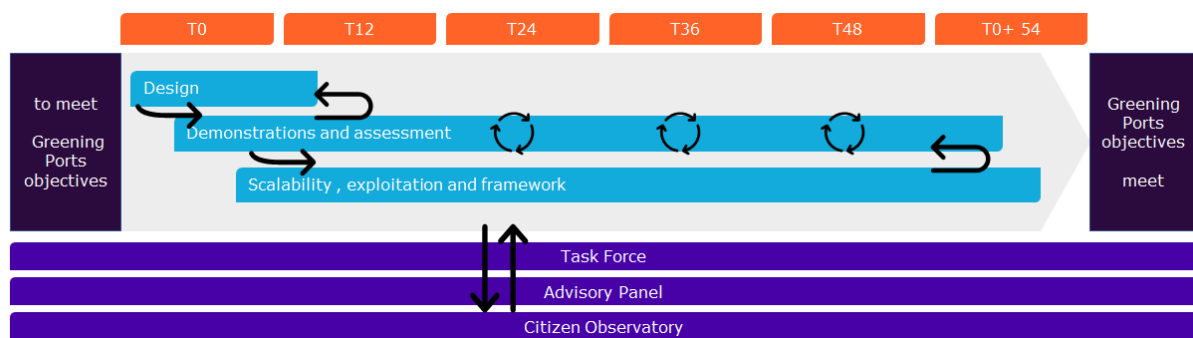


Figure 9: GREENING PORTS approach

1. Design

During this phase, WP1 will perform a diagnostic to evaluate the current situation of the port, in terms of “green” maturity and carbon footprint. The ambition behind is to have concrete inputs to define the main uses cases for phase 2. The diagnostic will combine long term objectives and already existing initiatives and/or services/prototypes at each port. A benchmark will be carried out to fully frame the decarbonization roadmap shift and deployment. As a result of this phase, the services to be implemented will be defined alongside the definition in a qualitative approach of the KPIs related to the services. During the Design phase, the ports’ taskforces will be created gathering business, academia, citizens and port authorities in a multi-actor team to ensure the implementation of the services and to accelerate the demonstration.

¹² <https://www.scaledagileframework.com/>

2. Demonstrations and assessment

This phase will demonstrate the Green Port services in a relevant environment TRL 6-7 (WP2). First, hardware and software services will be implemented, conducting feasibility studies and evaluation of costs, with a precise definition of the target KPIs, in a quantitative approach this time. During this phase, strength interaction with Port Taskforce will occur through regular meetings and a strong linkage with both WP3 (demonstration) and WP4 (quantitative assessment). Then, the operational Demonstration in lighthouse/fellow ports and assessment will take place.

The activities will cover the integration of the services in existing systems of the port, and the demonstration of the technological services and digital services. It deals as well with EU-Satellite based solutions demonstrations. During this step, the real-life services will be demonstrated in operational environment with a target TRL 7 minimum, where KPIs will be demonstrated (during WP3) in each Port. All KPIs are reachable and assessed by the dashboard to evaluate its impact (WP4). An initial draft of KPIs¹³ list is presented in Table 3. This step will have strong interaction with WP2 to ensure continuity of the services and adjustment considering the effectiveness of the services demonstrated will be continuously improved based upon the assessment of sustainable KPI from WP4. To maximize the impact, the assessment would provide a picture of the CO2 emissions of the port before and after the services demonstrations to showcase real effectiveness of the taken actions.

Impact to measure	Preliminary KPIs/indicators to be implemented
Clean Energy	Renewable energy and green hydrogen integration level
	Energy simulations and optimisations evaluation
	Solar Hub deployment monitoring
	Energy services assessment
	Energy mix ratio
	Self production level
	Levelized Energy cost
	Energy savings (building, on-shore/off shore vehicles, ships)
Logistics and Mobility	Transparent multimodal positioning and communication service assessment
	Ships operations (i.e loading/unloading ships, quays and berth) reduction time
	Green smart logistics assessment
	Multimodal and efficient access
	Logistics services monitoring
	Employee and truck mobility service monitoring
	Traffic demand forecasting
	H2 and/or Electric small vehicles use monitoring
	Total and average cost for resource usage
	Level of saturation of infrastructure
Environment	Connection between port and surrounding area
	Air quality monitoring, GHG and air pollutant emissions
	noise , water quality monitoring
	Safety for environment
	Environmental impacts of (energy/mobility) mitigations measures
Stakeholders, Ports and Citizen	Reduction of CO2 emissions and noise due to 1) port operations 2) in/out port traffic flows 3) from/to the city
	Citizen feedbacks on their environment
	Stakeholder political acceptance, and safety for citizen
	User acceptance for mobility solutions from/to ports
	National, regional and local authorities support
	Local stakeholders (association, group,) acceptance

Table 3 Initial draft list of KPIs in the Dashboard

3. Scalability, Exploitation and Framework Phase

At the same time, the project will concentrate significant effort in the definition of a tailored framework to ensure the long-term sustainability of the solutions implemented in the lighthouse and fellow ports, to boost the scaling up and to ensure the replicability across other ports in Europe. This phase will be fed by each WP outputs including the taskforce recommendations. The main objective of this step is to create new business models, innovative green financial mechanisms, and appropriate legal recommendations. Likewise, standardization including legal and technical aspects in conjunction with the Master Plan will facilitate replicable green ports across Europe and the inclusive and sustainable future of European Ports.

Besides general coordination, transversal activities all along **GREENING PORTS** phases, as cooperation activities (WP5) and engaging communities and boosting green ports (WP7) will have a crucial role to maintain the link with existing projects and initiatives and to make the difference in ensuring **GREENING PORTS** 'performances and results reach the wider communities beyond the consortium and the European ports ecosystems. This latter will be supported by EIT InnoEnergy and EIT Urban Mobility commitment to extend the outreach.



Lighthouse and fellow ports for demonstration, evaluation and assessment activities

The ports of **GREENING PORTS** are **diverse**: having seaports & inland ports, with different social and economic issues, ensures the enough diversity of scenarios for testing, and with limited resources, to ensure the replicability



¹³ KPIs are a preliminaray mixed list provided by WP2 and WP4 activities.
GREENING PORTS

with adapted business models. The focus on medium ports is justified in page 2 of the proposal. The **GREENING PORTS** platform is presented to ports as a modular solution to be adapted to their needs and challenges. All of them have common environmental challenges as reducing GHG emissions and energy consumption, improving air quality, transition to alternative fuels and optimise mobility, however they all have their specificities. The consortium ports have already identified the different services to be applied, implemented, demonstrated and assessed in real environment which are summarized in the table below and then described hereafter per port.



GREENING PORTS solutions	Lighthouse	Fellow1	Fellow2	Fellow3
	Gdynia	Klaipeda	PAS	Limassol
Services: Energy	Service 1 Service 2	Service 1	Service 1 Service 2	
Services: Mobility and Logistics	Service 3 Service 4 Service 5	Service 5		Service 5
Services: Environment	Service 6	Service 6	Service 6	Service 6
Master Plan	Yes	Yes	Yes	Yes
Dashboard	Yes	Yes	Yes	Yes
Business Model	BM1. BM2. BM3	BM1. BM2. BM3	BM1. BM3. BM4	BM1. BM4



Lighthouse port: Port of GDYNIA (Poland) PDGA		
Port general information		
Type	Multi-purposes seaport	
Location	Baltic Sea	
Size	In 2019: 897k TEU – 364k passengers – 14M tons of cargo	
Description	2 nd Port in containers in the Baltic Sea crossroad between the EU, Scandinavia and Asia Proximity of port industrial and residential areas Planned large infrastructure investment programme in the port	
		
Port challenges and related services		
Services Area	Port Pain points	Proposed services (Partner, demonstration period)
Energy	Energy dependence Green buildings	Multi Energy Hub; PV panel and wind turbines production for green electricity distribution and storage/charger facility (UNIGE, AT, M12-54)
		PV panel & wind turbines to power new infrastructure in port area (Gdynia, M9-M54)
		H2 production and storage (Gdynia, AT, M12-M54)
		Heat Pumps and Dimmers for Buildings (Gdynia, AT, M12-M54)
		Multi Energy Hub Management: simulation of solar and wind production with storage and charger facilities integrated with existing and new grid accessible via the dashboard (WP4) (UNIGE, DEMS, M12-M54)
Mobility and Logistics	Intense heavy truck traffic Complex port access Car traffic inside port area and vicinity	Solar Hub Environmental Network, including traffic and mobility flows measurements and mapping. (Gdynia, SIARQ, M12-M54)
		Smart Park Zone transport hub for trucks (Gdynia, FCT AT, M9-54)
		On demand bus electric services to connect the Gdynia port to the city (FCT, M9-M54)
		Decision support system for smart logistics and port traffic flow (UNIGE, DEMS, CERTH, M30-M48)

		Demonstrations beyond energy supply: Setup of charging station for scooters to limit car traffic inside port area & vicinity with PV panel and wind turbines to charge station (Gdynia, AT, M9-M54)
Environment	GHG emissions Poor Air Quality Lack of Environmental monitoring Noise impact	GHG concentration maps & emissions with high precision monitoring network (CNRS, M12-M18 & M36-M42)
		High-time resolution mapping of PM port emission through horizontal lidar techniques (CyI, M15 & M39)
		UAV-based 2D mapping of GHG (CNRS, M15; M39) and ship emission factor control (CyI, M15)
		Model-based estimate Air Pollutant & GHG port emissions (BSC, M12-M54)
		Solar Hub Environmental Network, including Air Quality and noise measurements and mapping. (SIARQ, M12-M54)
		Waste and ballast water cleaning systems

Fellow port 1: Port of KLAIPEDA (Lithuania) KSSA		
Port general information		
Type	Multi-purpose deep water port	
Location	Baltic Sea	
Size	In 2019: 703k TEU – 68k passengers in 2019 – 46M tons of cargo	
Description	Unique port of the country, 5 th in containers in Baltic Sea. Lagoon port with geographical proximity of port industrial and residential areas Planned new infrastructure investment in the port	
 PORT OF KLAIPĖDA		
Port challenges and related services		
Services Area	Port Pain points	Proposed services (Partner, demonstration period)
Energy	Energy dependence Green buildings	Small Scale Pilot Green hydrogen generation station to demonstrate green hydrogen production. (AT, KU, M12-M24)
		Energy Management simulation of the hydrogen workboat navigation in the port area (UNIGE), interaction with the port traffic, optimization of the boat energy consumption, simulation of the refuelling manoeuvre and selection of the proper position of the refuelling station, simulation of the communication flows accessible via the dashboard (WP4) (AT, KSSA, KU, M30-M45)
		Solar Hub and Lightening (SIARQ, M10-M11)
Mobility and Logistics	Bad air quality due to port operations	Demonstrations of sustainability beyond energy supply: Further scheduling of the electrification of rail locomotives (KSSA, KU M12-M45)
		Stevedoring Electrification (KSSA, KU M30-M45)
		Electric Hybrid Driven workboat navigation optimization, energy consumption, refuelling manoeuvre and selection of the proper position of the refuelling station from dashboard (KSSA, KU AT, M30-M45)
		Fuel workboats retrofit into green fuel (AT, KU, KSSA M30-M44)
		Solar Hub Environmental Network including traffic and mobility flow. PV cells power the network to delivery electricity and route data to dashboard WP4 (KSSA, KU, SIARQ, M9-M48)
Environment	GHG reduction Air quality	Mobile-van-based 2D mapping of GHG and Air pollutant emissions (KSSA, KU, M15 & M45)
		Model-based estimate Air Pollutant & GHG port emissions (BSC, M12-M48)

		Solar Hub Environmental Network including Air Quality and noise monitoring (KSSA, KU, SIARQ, M9-M48)
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Fellow port 2: Autonomous Port of Strasbourg (France) PAS		
Port general information		
Type	Multi-purpose inland port	
Location	Rhine River	
Size	In 2019: 340k TEU – 800k passengers in 2019 – 7,6M tons of cargo	
Description	2 nd largest inland port in France Maritime interface with Baltic Sea and North Sea Most important river tourist attraction in Eastern France	
		
Port challenges and related services		
Services Area	Port Pain points	Proposed services (Partner, demonstration period)
Energy	Energy dependence	Multi Energy Hub: H2 production for green electricity production and supply and storage/charger facility (PAS AT, M12-54)
		Multi Energy Hub Management: energy simulation of hydrogen workboat navigation in the port area, interaction with the port traffic, optimization of boat energy consumption, simulation of the refuelling manoeuvre and selection of the proper position, of the refuelling station, simulation of the communication flows to/from dashboard (WP4)) (UNIGE (M9-M54)
Mobility and Logistics	Improve tourist's mobility	Demonstrations of sustainability beyond energy supply: hydrogen vessels Batorama (10 excursion tourist boat day trip) and (PAS AT M12-M45)
	Reduce air pollution due to diesel locomotive	hydrogen locomotives for employee mobility (PAS, AT, M12-M45)
		Optimization of hydrogen trucks traffic (PAS, AT, M12-M45)
		Decision support system for smart logistics (UNIGE, DEMS, CERTH, SINAY M30-M54)
		Decision support system for port traffic flow (UNIGE, DEMS, CERTH, M30-M54)
Environment	GHG reduction Poor Air quality	Air pollutants concentration maps with a new generation of low-cost Air Quality sensor network (PAS, SINAY, CyI, M18-M24 & M42-M48)
		GHG concentration maps & emissions with high precision monitoring network (CNRS, M12-M18 & M36-M42)
		Model-based estimate Air Pollutants & GHG port emissions (BSC, M12-M54)
		High-time resolution mapping of PM port emission through horizontal lidar techniques (CyI, M21-M27 & M45-M51)
		UAV-based 2D mapping of GHG (CNRS, M21; M45)

Fellow port: Port of Limassol (Cyprus)		
Port general information		
Type	Multi purposes seaport	
Location	East South Mediterranean Sea	
Size	In 2019: 500k TEU – 1000k passengers	
Description	1 st port in Easter South Mediterranean Main commercial port of the Republic of Cyprus for transit trade from the EU and Middle East	
		
Port challenges and related services		
Services Area	Port Pain points	Proposed services (Partner, demonstration period)

Mobility and Logistics	Intense heavy ships and cruisers traffic	Integrated simulator environment using real equipment or realistic replicas within various scenarios.
	port access congestion from sea	Digital port call to set up port RTA (decarbonization of the port area eliminating waste on anchorage) (WTSL, M18)
	ship traffic inside port area and vicinity	Voyage and RTA replanning on the voyage execution stage driven by changing environmental and operational conditions; (WTSL, M30)
		Planning of a port resource assignment (pilot and tug services) to facilitate ship entry (WTSL, M42)
Environment	GHG emissions	High-time resolution mapping of PM port emission through horizontal lidar techniques (CyI, M15 & M39)
	Poor Air Quality	
	Lack of Environmental monitoring	Model-based estimate Air Pollutant & GHG port emissions (BSC, M12-M54)

1.3.5 Sex and Gender analysis

Beyond ensuring a gender-balanced composition of the Consortium, the **GREENING PORTS** partners will consider and address sex and gender aspects throughout the implementation of the various project's activities:

- **Service Design:** to ensure fair assessment and consequently the necessary acceptability for all activities to be performed. As previously demonstrated by Kassinis et al.¹⁴, gender diversity influences environmental sustainability initiatives and is a key aspect especially when addressing market solutions. Moreover, influence of sex/gender on port services will also have to be considered to avoid designing non-satisfactory services and solutions.
- **Service demonstration:** the testing of the services will ensure to get feedback from a gender-balanced perspective to ensure its acceptability.
- **Data collection:** The personal data collected in the project will be sex and gender segregated. All personal data collected for the purposes of the project will be processed and correlate with other demographic variables (age, disability/reduced-mobility status, needs) in their analysis of transport inclusiveness.
- **Decision making:** Port Task Forces as well as the Advisory Panel will be gender-balanced and consisted of experts from multidisciplinary backgrounds that will invited to share experiences and co-create the project's outputs.
- **Dissemination and communication:** Sex and/or gender analysis will be promoted as much as possible and particular attention will be given to create and promote direct links with relevant initiatives like Women in Transport – EU Platform for change¹⁵, or connect with European Women's Lobby that has as a mission to influence and consult the EU institutions in decision-making¹⁶.
- **Exploitation & market uptake:** it will consider approaches to avoid leaving anybody behind and ensuring inclusivity in the marketability.

1.4 Ambition

GREENING PORTS main ambition is to deliver operational innovative port solutions allowing to reduce GHG emissions by 15% over the project duration. The project will support the transition towards zero net GHG emissions and support Europe to drastically reduce waterborne transport emissions by 2025, in line with European Green Deal objectives. With the starting elements relying on best practices from different pillars such as readiness of technology, maturity of non-technological activities, the project aims to provide a reliable frame for the Green Port of the future, with new configurations for co-generating future services for ports.

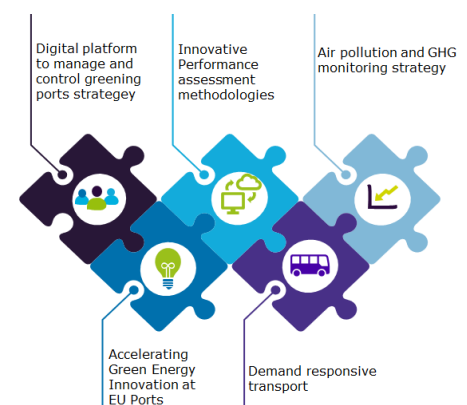


Figure 10: Five Ambition aspects

¹⁴ Kassinis, G.; Panayiotou, A.; Dimou, A.; Katsifaraki, G. Corporate Social Responsibility and Environmental Management 2016, 23 (6), 399–412. <https://doi.org/10.1002/csr.1386>.

¹⁵ https://ec.europa.eu/transport/themes/social/women-transport-eu-platform-change_en

¹⁶ <https://womenlobby.org/>

Having sustainability, inclusivity and innovation as our main drivers, **GREENING PORTS** intends to optimize the existing processes and offers innovative and zero-emission solutions in a large spectrum of aspects, presented hereafter:

A digital platform to manage and control the greening ports strategy	
State of the art	Progress beyond
There are some aggregation EU funded data platforms in the market (4 ESA DIAS) that provide the environment for private and public users to host tools and services supported by EU satellite-based data. Services can achieve a step change in terms of scalability and costs reduction by using cloud resources where the needed data are hosted. Among the platforms WEkEO DIAS is the operational digital platform which will be used to manage and control the GREENING PORTS strategy. WEkEO is the Eumestat, Mercator Ocean and ECMWF platform offering a large portfolio of Copernicus data and services. This platform also offers the opportunity to create and subscribe to Virtual Processing Environment to develop cloud-based applications and services with a direct access to data through a dedicated network.	Our project proposes to define new metadata models considering the GREENING PORTS strategy, adapting the interface according to standards. The Dashboard developed by TAS proposes also to develop APIs to collect different sources of data (Copernicus Satellite Sentinel 2 and Sentinel 5p, WEkEO, Copernicus Core Services (CAMS), Drones, IoT and existing port systems) and data from on-going projects (see WP5) according to their sharing policies. TAS will store these data and make them available for the developments of an advanced dashboard to assess the impact of the GREENING PORTS transformation strategy. Artificial Intelligence is certainly one important part of the full solution, enabling exploration of big data and bringing new insight and predictive capabilities to the ports' operations management.
Innovative Performance assessment methodologies	
State of the art	Progress beyond
There are several initiatives for addressing the environmental performance of ports, such as the European EcoPorts initiative ¹⁷ , the Port Environmental Review System ¹⁸ , and the Green Marine Programme ¹⁹ which offers a “detailed framework for maritime companies to first establish and then reduce their environmental footprint”. However, most existing methodologies for estimating environmental impacts of port activities are mostly qualitative and include self-assessment methods, which can often lead to biased results. So, there is an urgent need for a quantitative, industry validated, and cohesive method that would give more accurate results. Within the framework of the H2020 PIXEL project, Široka, at all ²⁰ present very recently the first effort made towards the development of an IoT leveraged, comprehensive and standardized Port Environmental Index (PEI). Nevertheless, there is still a need for a multi-dimensional performance assessment scheme, supported by machine learning and big data analysis methods, to assess the long-term performance of greening solutions in order to help port authorities in decision-making.	1) developing metrics suitable for both European and International medium size port solutions efficacy including “inland and lagoon ports” and performance assessment with an emphasis on interactions of the system's components, 2) implementing an innovative multi-dimensional performance assessment scheme based on the monitoring strategies designed and implemented in the project in order to assess the long-term performance of the deployed solutions and quantify the multiple benefits from the interactions between them in the ports, 3) designing a dashboard for summarizing the KPIs portfolio to help the port authorities in decision-making using explainable AI (XAI) for big data analysis, 4) using the acquired port field data, the assessment system and project tools to evaluate and demonstrate the positive impacts of GREENING PORTS and their interactions with existing port infrastructure in the demonstration ports (lighthouse and fellow) at a variety of scales (local, national, EU, global) and under a variety of conditions, set within a context to allow for cross-comparisons and cross-fertilization of lessons between ports causing replicability/scalability and also opening new markets
Air Pollution (AP) and GHG monitoring strategy (Service 6)	
State of the art	Progress beyond

¹⁷ EcoPorts, 2019a Self Diagnosis Method (SDM): The user-friendly environmental checklist. <https://www.ecoport.com/sdm> (Accessed 15 May 2020)

¹⁸ EcoPorts, 2019b. Port Environmental Review System (PERS): the only port sector specific environmental management standard. <https://www.ecoport.com/pers> (accessed 15 May 2020).

¹⁹ <https://green-marine.org/about-us/> (accessed 15 May 2020).

²⁰ Široka, M., Piličić, S., Milošević, T., Lacalle, I., & Traven, L. (2021). A novel approach for assessing the ports' environmental impacts in real time—The IoT based port environmental index. *Ecological Indicators*, 120, 106949

<p>Medium-cost Air Quality + GHG Sensors: Air quality monitoring conventionally relies on environmental monitoring stations, which are very expensive both to acquire and maintain. As a result, these stations are rarely deployed in ports, resulting in limited knowledge of pollution hotspots.</p> <p>Low-cost air sensors have emerged recently as an alternative that can also improve the spatial resolution of monitoring. However, they often suffer from cross-sensitivities between different air pollutants, biases from weather changes, and their accuracy usually degraded over time.</p> <p>Recent technological developments of Medium-cost Air Sensors by GREENING PORTS partners²¹ offer new perspectives for dense air sensor networks with performances comparable to reference/certified instruments deployed within environmental stations.</p> <p>Inverse Model for Emission Monitoring: “Top-down” atmospheric approaches that can combine or assimilate information from a dense GHG network to constrain CO₂ fluxes at relevant scales in urban domains are in rapid development in the last few years and can be used to further constrained self-reported (“bottom-up”) emission inventory and identify major discrepancies in activity sectors²². Such approach has been already used/validated by GREENING PORTS partners for large/complex city scale environments (e.g. Paris region, Indianapolis).</p> <p>Model-based Emission Inventory: The development of reliable anthropogenic emission inventories is crucial to understanding air pollution sources and designing effective emission abatement measures. The latest High-Elective Resolution Modelling Emission System “bottom-up” module developed in 2020 by GREENING PORTS partners²³ allows for high-resolution emission inventory from multiple sources (energy, transport, etc), hence appearing as an ideal tool to measure port emissions and test different mitigation scenarios.</p>	<p>Using a combination of the “bottom-up” and “top-down” approaches, GREENING PORTS will provide new environmental services to help port authorities in testing the efficiency of their low-emission mitigation measures.</p> <p>The “bottom-up” approach will be used to calculate primary AP (CO, NO_x, NH₃, SO₂, PM) and GHG (CO₂, CH₄) port emissions and simulate the benefits of various abatement scenarios. It will use the in-house HERMESv3 system to obtain a highly spatialized (100x100m) emission inventory from a comprehensive suite of external data (e.g. ship emissions data derived/processed from individual vessel's Automatic Identification Systems).</p> <p>The “top-down” approach offers independent means of verification of the efficiency of the low-emission mitigation measures directly from atmospheric measurements. It will provide a-posteriori ground truth estimate of the emissions of the port using a high-resolution Gaussian multi-plume (inverse) model fed by a dense atmospheric network of medium-cost GHG sensors.</p> <p>Several additional complementary technologies will be considered here to enhance the accuracy of these two (bottom-up/ top-down) approaches:</p> <ul style="list-style-type: none"> • An active mapping of PM covering the entire port area will be performed with a new horizontal lidar technology to better constrain the HERMESv3 spatialized emission inventory and quantify in real-time PM hotspots. • UAV-sensor systems will calibrate the lidar PM retrievals, provide additional 2D mapping of with GHG and AP over the port area, and further constrain the hypotheses used in HERMESv3 for AP emission factors of stack emissions. • The construction of a dense monitoring network of AP using a range of reliable ‘medium-cost’ sensors will offer extra opportunities to quantify the overall improvement of Air Quality at populated locations of the ports.
Demand responsive transport (Services 3,4 and 5)	
<p>State of the art</p> <p>The current modal share of the mobility connection between city centre and port premises shows a high participation of motorized private vehicles (53% in Gdynia port city). In addition, public transport in ports (as it happens with business parks located away from city centre) is not working as an alternative to private vehicles, because it is not user centric, it does not meet customer (employee or traveller) needs and demands. The deployment of on-demand services in Europe is still low and the mix of an on-demand bus service with a micro-subsidy engine calculation</p>	<p>Progress beyond</p> <p>The mix of an on-demand bus service with a micro-subsidy engine calculation plugged on to the mobility platform is unprecedented in Europe. The project will develop and test disruptive and unprecedented mobility measures consisting in demand responsive transport (DRT) providing a flexible an efficient service to connect port premises with the city centre while maximizing vehicle occupation and putting the user in the centre of the proposal. The evolution of the on-demand service will be developed in three ways:</p> <p>Totally adaptable to all types of operating models: door-to-door or virtual stops booked for the users in a tailored</p>

²¹ Bezantakos et al., 2021; Joly et al., 2020

²² Lauvaux et al., 2020

²³ HERMESv3; Guevara et al., 2020

<p>plugged on to the mobility platform is unprecedented in Europe.</p> <p>There is also room to improve the truck parking operations at ports. According to the European Commission these aspects are contributing to “bottlenecks in ports and their hinterland due to inadequate services can result in extra congestion, extra emission and extra costs for shippers, transport operators, consumers and society as a whole”.</p>	<p>routes model with flexible schedules adapted to the port activity.</p> <p>Port MaaS perspective: the NE-MI mobile application will be able to purchase public transport tickets, chose the type of available vehicles (bus shuttle or shared electric vehicle) and will include micro-subsidies for promote the commuting of workforce through an e-wallet or direct economic discounts. It will also promote multimodal mobility and boost inclusive and sustainable mobility by providing economic support to vulnerable-to-exclusion groups.</p> <p>Monitorization of KPIs: the CO2 emissions saved will be available for assessing the pilot performance</p>
Accelerating Green Energy Innovation at EU ports (Service 1, 2)	
<p>State of the art</p> <p>Ports play a pivotal role in Europe’s decarbonization agenda as they host many industry sectors (cruise, oil & gas, manufacturing, power generation...) and their activities themselves can be decarbonized. Electrification will play a major role to decarbonate these activities. Today most ports in Europe rely on coal, natural gas or even diesel power-generation. Renewables are increasingly being used to complement or to supply standing vessels. For instance, the Port of Hull (UK) hosts a 6.5 MW solar rooftop project capable of saving 2,6 MtCO2/year. Digital will play a significant role for energy management and optimization of operations. Portsmouth International Port recently announced partnering with Connected Places Catapult to develop advanced information services to streamline supply chain logistics using geospatial data resources²⁴.</p>	<p>Progress beyond</p> <p>GREENING PORTS will aim at identifying the more advanced clean energy services (RE and green hydrogen) with the greatest impact and most immediate effects: having a comprehensive review of energy and waste consumption, greening energy supply, develop electric mobility solutions for on-site ports,</p> <p>GREENING PORTS is convinced that Lighthouse and fellow ports will be placed as European Ports leader in Renewable Energy. Our proposal keeps a strong attach with the objectives of the 2016 Accelerating Clean Energy Innovation Communication²⁵, and particularly, it shares a common vision regarding the use of clean energy , energy storage solutions, energy efficiency in buildings, as well as electro mobility and more integrated urban transport systems.</p>

Our proposal presents three main innovative aspects:

DATA. Introducing EU Satellite-based solutions as input to manage and monitor ports’ strategy: Over the last decade, rapid developments in digital technologies and in our capability to monitor our planet from space with Earth Observation (EO) satellites have led to new and tremendous opportunities for applications and for port ecosystems. **GREENING PORTS** will use for the first time EO data (environmental pollutants and CO2 concentrations) to monitor and manage green ports’ strategy. The improvement and downscaling of services to the port land and sea area using the six Sentinel families (Sentinel 1-6) can boost the appearance of new services. As for the innovative instruments put forward the EU satellite-based solutions combined with digitalization will ensure the acceleration and replicability of green ports transformation. The digital space data will be complemented by a set of new green tools for energy efficiency on mobility, logistics and building.

CITIZENS. Putting citizens at the core of the design strategy: Services of the **GREENING PORTS** proposal will be co-designed with ports’ stakeholders and citizens. Citizens will be integrated in the decision-making process through citizens’ observatories. Citizens research will be implemented in each port to map citizen-problems related to ports’ activity and different citizen engagement activities will be undertaken, interviews, world cafes, co-design workshops to get as much information as possible. The process put citizens in the heart of the process where they become actors actively mapping problems and designing solutions. Engagement techniques & tools will be provided to ports’ managers of the pilots to empower them and to ensure the continuity of this process after the project.

OPEN INNOVATION. Use of open innovation to solve existing ports’ challenges: the problems and solutions identified by citizens and port stakeholders that are not in the scope of the **GREENING PORTS** proposal,

²⁴ <https://safety4sea.com/spaceport-project-to-boost-ports-efficiency-using-geospatial-data/>

²⁵ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf

will be structured in an open innovation challenge at EU level the **GREENING PORTS** Porthaton (WP7). Challenges will be put online in a dedicated website with instructions to participate in the Porthaton. The Advisory board will participate as the jury to select the best-in-class solutions proposed. An economic prize and online scaleup support (by 3OC) will be provided to the winners of the different challenges.

2. Impact

2.1 Expected impacts

GREENING PORTS is aiming at developing and demonstrating cost-effective and low carbon solutions for ports to manage its green transformation strategy. Its main impact will be to Put European ports on track to reduce their GHG carbon emissions by reducing its carbon emissions by 15% in 4.5 years and contribute to the wider European carbon neutrality target by 2050. It answers to the expected impacts (EI) listed in the call as follows.

<i>EI 1: 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 ports;</i>	
Our project combines services that are already commercially widespread (e.g. energy consumption and environmental monitoring tools) and innovative ones that haven't been demonstrated on large scale sites (e.g. complex modeling of logistics flows between hinterland, on-site traffic and ships). For these services it will be the opportunity to showcase their impact and reduce costs through the deployment at scale. Accelerated deployments are foreseen for: Service 1 supporting green transport fuel supply demonstrations (WP3) to power green workboats , to recharge electric on shore vehicles as scooters, bikes, locomotives, but also drones and other devices to meet the electrical demand of mobility in ports. In addition, classic storage solutions with cryogenics, compression, ammonia, solid components, will be considered. Innovative storage methods like the use of organic liquids will also be evaluated. Hydrogen is used for power generation with internal combustion or fuel cells. Finally, the use of advanced biotechnologies is addressed through the use of algae tanks to both capture CO2 emissions (from traffic, ships, industry...) and produce biofuel. Service 2 covers waste energy reduction with optimum management of ship/boat traffic scheduling/routing. Low carbon energy supply and demand impact assessment and energy consumption assessment (incl. green building solution ENERGISME for energy balance will be then accessible for Lighthouse via dashboard).	
Indicator 1A: Saved CO2 emissions according to kWh consumed in each port demonstrations, assuming 10% renewable energies penetration	50g/kWh
Indicator 1B: EcoPorts Certification per port (PERS, ISO or EMAS certified)	1
Indicator 1C: Light vehicles charged per year in pilot, in %	>35%
<i>EI 2: clean energy/fuel production and distribution (particularly green hydrogen and electricity) and increased alternative (bio-) fuel supply, with re-fueling and re-charging capabilities;</i>	
Service 1 allows clean energy production and distribution : 1) green electricity production by renewable energies available in ports: solar, wind, and marine (wave, current, thermal and osmotic) power, i.e. a solar HUB will be deployed in Lighthouse and Fellow ports. Solar HUB generates enough energy to self-charge plus charge lighting, sensors and other electronic devices. Lighting can be customized and controlled remotely depending on the port's needs, increasing the efficiency of the lighting system. The energy produced by this hub can be stored with batteries and be used to charge electric vehicles like scooters, bikes, light weight vehicles, drones and other devices and meet the electrical demand of mobility in Lighthouse Port. 2) low carbon fuels will be generated (green hydrogen, ammonia, biofuels and LNG). The last one, even if not totally decarbonized, can be a good intermediate solution in a process of transition from carbon to renewable energy. As covered by Services 1 and provided to our ports, decarbonized energy for mobility (incl. rail and onshore vehicles) and for port operations and logistics will be supported by using hydrogen, electricity and biofuels propulsion. For instance, demonstration will be done in fellow port in Lithuania replacing existing working diesel generator with fuel cell addressing operational and fuel/refueling safety issues. The concept of this vessel is planned to be in operation in 5 years by the port authorities of Klaipeda.	
Indicator 1C: Light vehicles charged per year, in %	>35%
Indicator 2A: Renewable energy/hydrogen integration in %	>20%
Indicator 2B: Reduction of GHG emissions between 2022 and 2027, in %	>15%
<i>EI 3: green ports as multimodal hubs, optimising passenger and freight flows for low emission mobility, in a context of much stricter public health criteria;</i>	
Service 4 is dedicated to optimising traffic flows from/inside the port, including passengers and freight flows over a wide area including city and other logistics' terminals surrounding the port. The service enables to select flexible itineraries, potential virtual pick-up points and expected timings and to meet local regulation. To improve air quality in the wide port area, solutions (e.g., digitalisation of documents, presence of smart parking lots , innovative mobility services , etc.) are also taken into consideration. Service 4 will be implemented in Lighthouse Gdynia Port	

<p>and a mobility and logistics flow impact assessment will be possible via Dashboard enabling mobility flow supervision</p> <p>1) H2 and green electric small vehicles use monitoring 2) multimodal and efficient access monitoring 3) seamless logistic operations assessment 4) traffic demand forecasting 5) transparent multimodal positioning and communication service assessment. Service 2 develops a two level DSS with the aim to optimise ship traffic in/out of the port 'wide' area, to reduce/avoid queuing with idling engines. The service can integrate public waterborne transport and port work boats. The service also optimizes the electric workboat routing with respect to available green electric production and storage in the multi energy HUB. Service 6 demonstrates an easy deployable UAV-based solution to monitor sulphur ship stack. This service supports the implementation of the EU Directive 2016/802 (codification of Council Directive 1999/32/EC), as regards to the sulphur content of marine fuels. Tests and validations will be conducted in Lighthouse and fellow ports using lightweight and highly sensitive SO2 and CO2 sensors complying with the technical requirements (sensitivity) of EMSA. On top of this, the Dashboard will assess to the quality level of cost-effective services related to the real-time monitoring of EU-regulated air pollutant concentrations in the Port area for public information and in support of stakeholders to monitor the efficiency of mitigation measures on local Air Quality.</p>	
Indicator 3A: Dashboard displays UAV based ship emission control to monitor Sulphur emissions from ship stack (EU Directive 2016/802). % of compliance	>80%
Indicator 3B: Dashboard proves evidence of reduction of CO2 emission from mobility from/to city	>15%
Indicator 3C: Citizen (incl. port's workers) increased acceptance regarding mobility solutions	>20%
<i>El 4: energy-efficient and green port operations and buildings, green and smart logistics, integration with other low-emission transport modes (in particular rail) and promoting effective modal shifts;</i>	
<p>For building: Service 2 will conduct a building energy and thermal analysis to renovate and improve the efficiency of buildings on the landsite. Specific usages such as offices, warehouses or industrial buildings will be considered and studied to comply with each distinctive requirement. Innovative technologies, such as wind turbines, will allow fulfilling hot water needs. Passive methods for ventilation, cooling or heating systems will be taken into account; the well-designed synergy of these technologies will decrease energy consumption.</p> <p>For smart logistics and integration: Service 3 and 4 enable the reduction to traffic energy dependence integrating green smart logistics decisions support system optimizing 1) planning of port operations 2) scheduled daily operations 3) guidelines for the effective introduction of smart contracts 4) port traffic flows including road, rails and waterways.</p> <p>For multimodal shift: Service 5 promotes effective modal shift by 1) on demand transport tool (NE-MI) increasing the efficiency of public transport by optimizing km travelled 2) Carpooling service providing a sustainable solution for all employees' commuting will lead to a traffic reduction from/to the port and to optimize port's parking spaces 3) Smart Park Zone allowing for dynamic management of the truck flows/parking demand in order to minimize the environmental impact of smart park zones implementations, increase the effectiveness of the solution and support regulation implementation.</p>	
Indicator 4A: Dashboard shows reduction of CO2, NOx emissions, noise due to port logistics operations and due to at/to/from port traffic flows	>15%
Indicator 4B: CO2 emission savings in g/kWh according to kWh consumed (in comparison to conventional technology)	50g/kWh
Indicator 4C: Saturation level of the infrastructure network between port and port area	<30%
<i>El 5: reduced waterborne and other transport emissions, as well as improved air quality, biodiversity, contribution to the circular economy and reduction of noise at ports;</i>	
<p>Noise pollution monitoring services and Air Pollution & GHG monitoring and mapping services will be demonstrated in Lighthouse and fellow ports with measurement before and after the deployment to showcase the effectiveness of the services in the CO2 emissions reduction related to mobility and port operations and logistics. GREENING PORTS addresses biodiversity by a demonstration (Lighthouse) of innovative clean services using Polish FBT startup for green waste/ballast water management. The service relies on a natural water based innovative cleaning technique without detergent preventing dumping of polluted water from ports or ships which impact anaerobic life development and natural local aquatic life. In addition, CERTH detection by satellite of oily wastes and marine plastic pollution produced by ships from EU satellites will support the mitigation actions to improve subaquatic biodiversity. Regarding circular economy current solutions in ports range from on-board incineration to truck transfer from the port to local solid waste management and typically bear a great energy and environmental footprint. GREENING PORTS will contribute under WP1 dedicated task on Circular economy proposing a greener alternative for recycling biowaste as compost or biogas. Assessment of the impact of the proposed technologies will be included in the Master Plan for the future Green Port, addressing the associated investment/cost implications.</p>	
Indicator 5A: Dashboard maps expected improved emissions inventory at port	5-7%
Indicator 5B: Dashboard provides hourly ship traffic emissions (expected improvement from model-based estimations)	10%

Indicator 5B: Number of peer-reviewed publications about the effects of Environmental Services on air pollution and GHG emissions	>15
Indicator 5C: number of on-board food waste recycling designed solutions	>3
<i>EI 6: reduced emissions for cities and urban mobility, as well as improved city integration for ports;</i>	
<p>In general, the mobility modal share connection between city and port areas shows a high participation of motorized private vehicles (e.g. 53% in Gdynia port city) and the public transportation is not necessary adapted to user's needs (workers and passengers). GREENING PORTS will decrease emissions for cities and urban mobility by supporting 1) port decongesting through optimisation of ship and truck arrival to port 2) improving ship service planning avoiding extra costs for shippers 3) optimising information sharing among operators 4) better planning loading/offloading of goods and arrival/departure of ships and truck to and from ports and 5) better management of human and other resources (incl. employees commuting to/from port) 6) on-demand mobility service. All these inputs will be available via the dashboard delivering features on mobility monitoring and forecasts showcasing the positive impact of services 3, 4 and 5. GREENING PORTS Service 4 will deploy an on-demand bus service (NEMI) with a micro-subsidy engine calculation is unprecedented in Europe. In addition, Service 5 (Smart Park Zone) enables an accurate micro-regulation and dynamic management in on/off street parking, which allows sustainable and Smart Urban Mobility policies based on vehicle emissions, carbon taxation and autonomous vehicles parking infrastructure.</p>	
Indicator 6A: Users of services 4 facilitating port access at the end of the project	> 400
Indicator 6B: dashboard monitors and maps air pollution and GHG emissions to quantify expected emissions reduction for city (CO2 emissions saved will be available for assessing the pilot performance)	> 10%
Indicator 6C: Expected reduction of Noise and Mobility Flows monitored by dashboard	10-15%
Indicator 6D: increased perception of positive impact that the local port has on environment	>40%
<i>EI 7: 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;</i>	
<p>The GREENING PORTS proposal ensures the wide take up of its solutions by:</p> <ol style="list-style-type: none"> 1) Track record of previous CEF and willingness of the pilots to go on with these actions: the lighthouse port Gdynia is currently involved in the CEF "Transport" on truck traffic management system for the port and the fellow port PAS has accumulated 6 projects CEF over the 2013-2018 period. 2) Industry-led project with clear industrial commitment to go forward: four large industrial partners (CG, AT, TAS, WRTL) with a strong commercial network and deeply interested in moving the services forward. 3) Funding planned and already committed for greening ports actions in pilots: the ports of Gdynia and Klaipeda have large infrastructure investment programme planned in their ports²⁶, PAS is deeply committed to social responsibility policy on clean energy transition and biodiversity protection²⁷. 4) Other funding options sought with EIT Innoenergy and Mobility and with SMEs and startups from their network. GREENING PORTS partners intend to involve SMEs and startups with high TRLs from these networks and through the Porthaton. 5) Co-design of business models adapted to ports with limited resources. This aspect is key to design business models adapted to ports with lower revenue streams than bigger ports. 6) Synergies and clustering activities since the beginning of the project (ESPO, EcoPorts, BPO, etc) and the certifications sought in the pilot ports will ensure the follow up actions. 	
Indicator 7A: Number of EU medium-ports committed to test the GREENING PORTS solutions after the project	>5
Indicator 7B: New EU co-funding project in the Lighthouse/ Fellow ports during the project	>3
<i>EI 8: 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.</i>	
<p>With the ambition to reduce 15% of CO2 emissions related to maritime and port ecosystems, GREENING PORTS contributes directly to support the European Green Deal (2019/2956(RSP) to meet its goal of 50% CO2 emissions reduction by 2030. GREENING PORTS contribution to the European Green Deal will include recommendations from the GREENING PORTS master plan to accelerate the shift to sustainable and smart mobility. In terms of EU transport policy objective, our project has a direct and immediate contribution, the Lighthouse Port of Gdynia is an important link in the Corridor VI of the Trans-European Transport Network (TEN-T). TransEuropean Networks (TENT T3.5.1) gives clear guidelines to adapt the demand to an enlarged EU for widening zone members states (incl. Poland, Lithuania and Cyprus), to which our project largely contributes.</p>	

²⁶ <https://www.port.gdynia.pl/en/projects-and-investments/eu-projects-investment-2014-2020>

²⁷ <https://www.strasbourg.port.fr/responsible-port/responsabilite-societale/?lang=en>

Our project aims at actively contribute to the European Strategy for Low-Emission Mobility’ (COM(2016)0501), in which it proposed measures to accelerate the decarbonisation of European transport; towards the broadest use of alternative fuels (COM(2017)0652); the role of digitalisation in sustainable mobility (SWD(2017)0226); modal shift and co-modality, urban mobility, placing people at the heart of transport policy 2020/2058(INI); issues such as the Emissions Trading Scheme (ETS) (incl. maritime transport), alternative fuels infrastructure, CO2 emission performance standards are expected to be revised under COM(2020)0690, and could be supported by GREENING PORTS results. In addition, GREENING PORTS contributes to the EU ambitious technological programmes, such as the European satellite navigation system (EGNSS) Galileo, the Copernicus Earth Observation programmes by pushing the limit of EU-satellites based application in ports areas, showcasing the competitiveness of industrial space key partners. In addition, the COVID-19 outbreak and its subsequent impact on transport, has made the EU launch the ‘Transport and tourism in 2020 and beyond’ (2020/2649(RSP)) calling for rapid, short- and long-term support for the transport and tourism sectors to ensure their survival and competitiveness. Our GREENING PORTS project contribute to the recovery plan for member states too, e.g., the French economy post-Covid includes an entire chapter devoted to the greening of ports.

Indicator 8A: best practices/ Master Plan recommendations to be considered in EU Transport Policy and national recovery plans	>5
Indicator 8B: number of peer-reviewed publications about the implications to raise barriers for the decarbonization of ports	>5

Other substantial impacts not mentioned in the work programme:

GREENING PORTS impact on society

Job creation: According to the GREENING PORTS exploitation plan, there is a positive impact in terms of job creation with nearly 50-70 new positions to be filled. The main skills required will be software development and logistics, low-carbon energy supply and distribution, engineering, application programming interfaces and smartphone coding (for APP on both iOS and Android Stores), as well as technology and design developers innovation.

Capacity building for medium ports management: The green transformation of ports is a long-term process, which needs motivated, determined and skilled people. This is why, GREENING PORTS will identify the key skills required for the green transition of ports by involving different types of stakeholders: ESPO, MedPorts, AIVP, ELA, Dept. of Shipping Trade and Transport, University of the Aegean, Port of Patras, Greece, Port of Kaliningrad, Rosmorport, Russia, Corallia, members of the GALATEA project, si-cluster, Lithuanian Environment Protection Agency, Lithuanian Ministry of Transport, EIT Climate-KIC, EIT Urban Mobility, etc. (see session 4-5 Annex Support & Advisory Board Letters). This will empower port authorities’ employees with i.e. low-carbon strategy development, user engagement and new service design skills, which will allow them to continue the green transformation of the ports after the project. It will also leverage from existing ports development with learning expeditions to best practices’ ports.

Improved social awareness of environmentally friendly solutions for ports through local communication & dissemination activities: To improve the social awareness of GREENING PORTS environmentally-friendly solutions, 3OC, together with the project partners, will develop an effective and innovative communication and dissemination strategy. It will include local actions to engage with the pilots’ users and community (open days, world cafes) and will also reach out to research organisations, academia, mobility practitioners and transport planners, industry and public authorities.

Barriers that may determine expected impacts and measures to address them

Table 4: GREENING PORTS Barriers for expected impacts

Barriers/obstacles	GREENING PORTS measures to address them
Regulatory barriers may hamper the scaleup of services in different EU countries	Regulatory and legal aspects will be studied in WP6 to ensure an adapted framework to develop the services. Aspects related to data generation and protection, IPR, use of UAV in ports, but also public incentives and market driven instruments that could enhance the implementation of services are part of the scope of WP6.

Low user acceptance level regarding mobility solutions (service 5)	Co-design of services, with interviews, user research and ideation workshops will ensure the participation of ports' stakeholders and citizens and to take into account its main problems, whether that's reducing congestion, solving the first/last mile problem, or increasing access for underserved areas. Participation in the decision making will enhance acceptance of services.
GREENING PORTS services do not address ports needs	A dialogue within the pilot ports ecosystems will be established early in the project to better understand where their pain points and main problems are (WP7). GREENING PORTS has started the identification of problems at the proposal stage and will co-design the services (WP1) in line with ports' priorities.
GREENING PORTS Master plan, services & dashboard are too expensive for medium ports budget	The focus of the proposal on medium-size ports in ancient mining regions (Poland, Lithuania, Cyprus) with complex social context aims at designing business models taking into account this context. Restrictions in budget for the green transformation will enhance innovation to ensure replicability and fast adoption. WP5 will study different BM and financing options to ensure the fast replicability of the GREENING PORTS solutions.
Low citizen engagement in the ports affecting the inclusiveness of the project and the design of the services	The Citizen observatory (WP7) and strong communication campaigns are foreseen in our communication and dissemination strategy, ensuring the reach out to different port communities. The task force of each port will be in direct contact with port stakeholders and will identify if it occurs, with the possibility to reinforce engagement actions for specific cases.
COVID-19 impact and social fears	Online tools will allow discussions, workshops and meetings within partners and stakeholders. Engagement with ports' stakeholders and the co-design process, in case of extended pandemic situation, will use methods to facilitate virtual workshops and meetings to ensure virtual engagement. 3OC has adapted its methods with online tools (teams, mural, etc.)

2.2 Measures to maximise impact

2.2.1 Dissemination of project results

Ports face many challenges today, from reducing their greenhouse gas emissions to protecting the environment. Overcoming them cannot be done by a single actor. All stakeholders need to be involved to find solutions, including local communities. However, their public acceptance is an additional challenge that needs to be addressed. Pollution, dirt, noise and traffic congestion are some of the problems that are continuously raised when discussions are carried out with local populations. The **GREENING PORTS** project will aim to communicate widely on the different innovative concepts and solutions that are being implemented and disseminate the Master Plan for the future Green Port to all stakeholders who are also aiming to reduce greenhouse gas emissions and pollution in maritime and inland port areas. Specific targeted actions will be carried out to engage these stakeholders and citizens in solving these issues and involving them in the process.

The key dissemination and communication objectives for the GREENING PORTS project are to:

- **Communicate** on the project's objectives and activities, and disseminate the knowledge and results generated among stakeholders
- Boost **engagement** with the targeted audiences and raise awareness of how ports are aiming to reduce their environmental and social impacts
- To exchange with and collect **citizens' and communities' pains and problems** with regards to ports in order to address their needs and **co-design solutions**
- To identify and collaborate with other projects (**clustering**), associations and organizations, with the aim to share resources, achieve synergies and exchange project's results and knowledge
- To promote widely the **Master Plan** developed by **GREENING PORTS** to all actors who may be concerned in decision-making and analysis processes for ports.
- To **bring together** a variety of actors to work on specific port challenges and boost the uptake of green ports

To reach these objectives, **GREENING PORTS** will prepare a detailed dissemination and communication action plan with tailored actions for each target audience. It will be delivered at M3 and will outline all the activities to be undertaken. In addition to the communication actions further described in section 2.2.2, the **GREENING PORTS**

dissemination plan will analyse the main audience groups targeted by the project with regards to behavior, needs and language requirements (specialist vs non-specialist) to ensure that the most appropriate communication tools and channels are deployed, thus maximizing the reach and engagement during the implementation of the plan. The following core groups of stakeholders have been identified as potential audiences for the dissemination and communication actions:

Table 5: Stakeholder target audiences for the GREENING PORTS project

Local level	Local citizens living near ports, including those in the project	TA1
	Mobility & transport communities	TA2
	Environmental and energy communities	TA3
	Port authorities & cities officials	TA4
	Local and regional policy makers	TA5
Large scale	EU and national policy makers	TA6
	EU Port authorities	TA7
	Innovative SMEs	TA8
	General Public	TA9
	Scientific & technical organisations	TA10

GREENING PORTS will strictly follow the open access policy of Horizon 2020 by providing online access to information that is free of charge to the end-user and that is reusable. In the context of this project, scientific information refers to peer-reviewed scientific research articles (published in scholarly journals), articles, conference papers and research data. As such, the project will combine different measures to foster open access to knowledge as much as possible. A summary of the **GREENING PORTS** draft dissemination plan and its elements are shown in the table below. The plan is flexible: it can be adapted, and additional elements can be included as the project evolves in accordance with audience needs and interests. Several control mechanisms will be used to review the effectiveness of the dissemination plan.

	Project Focus	Description	Expected Impacts
STRATEGY	Designing the project identity & establishing the project's visibility	Design of project logo & branding, public project website, initial promotional material (flyer, rollup, ppt & word templates, poster) providing GREENING PORTS partners with the communications toolkit to promote the project. Set up of social media accounts (To be decided: Facebook, LinkedIn, Instagram). Press releases will be issued to announce the start of the project and the main milestones achieved.	Availability of knowledge, open access information, visibility of project's objectives and results
	Dissemination & Communication Plan	Detailed plan for stakeholder engagement considering all target audiences and requirements for effective reach (behavior, language, appropriate comms channels) with clear (SMART) objectives for implementation will be elaborated. Rigorous implementation monitoring and a mid-term review will be carried out.	
IMPLEMENTATION	Engaging target audience groups & promoting the project	<p>All audiences: A wide range of dissemination activities, including yearly newsletters presenting the project at external events, publishing articles in mainstream and specialist media, running the project website, communicating on social media will be carried out. In addition, multilingual targeted communication campaigns to raise the awareness of ports' challenges and ambitions to reduce GHG and pollutants emissions and become more inclusive will be rolled out. Demonstrating the positive impacts of Green Ports will be at the heart of the campaigns. They may take the form of success stories, factsheets, infographics, videos, interviews.</p> <p>To maximise engagement, Greening Ports will deliver a range of activities tailored to specific audience groups:</p> <p>Policy makers (including cities and local authorities): A policy brief summarizing the main elements of the Master Plan will be drafted to inform local, regional and European level policy-makers involved in the port/maritime sector on green ports and how they can be achieved.</p>	Inform on the greening of ports, enhance the public acceptance of ports in Europe, boost the knowledge and expertise on green ports, create new opportunities, contribute

		<p>Scientific/technical communities: The community gathered in Greening Ports will actively participate in international conferences. The main international and national conferences of interest identified at this stage for the consortium are listed in the table below. They will also aim to publish articles in journals, with a focus on open access schemes and on the EC's Open Research Europe publishing platform launching in early 2021, as well as depositing publications in open access online repositories, such as OpenAire Zenodo. Clustering activities with related projects and initiatives will be initiated.</p> <p>Port authorities and technical communities: the deliverables produced in the project will be turned into more visual, user-friendly 'briefing papers' summarizing each key deliverable to disseminate information in a more effective way to ports and boost the uptake of the project's results.</p> <p>Citizens and local communities (mobility, energy, environmental): Effective citizen engagement has a proven impact on the acceptability of solutions. Participatory approaches, where citizens and local communities are involved in the design and conception of these solutions, are becoming increasingly more common, and allow to open dialogue, develop relationships, and address issues that these communities are facing. The Citizen Observatory, developed in WP 7, will study the main pain points and problems of citizens living close to the ports in the project and produce a prioritized map of existing problems linked to the ports' activities.</p> <p>A series of co-design workshops involving these local communities, the project's partners, and ports will then be organized to integrate their inputs into the design of the services/solutions that will be implemented in the project. Listening to their needs and engaging them in the design process will help bring them closer to the ports activities and give them a better understanding of how these ports are striving to become greener.</p> <p>Innovative SMEs: Specific actions to communicate on the project through networks, clusters, associations will aim to target innovative SMEs to raise awareness of the potential of the port/maritime sector market. In addition, the Portathon (see below) will invite them to participate in the challenge and potentially deploy their technology/solution.</p>	<p>to overcoming barriers for uptake, create stronger port communities</p>
CAPITALISE	<p>Contributing to the uptake of green ports in Europe</p>	<p>Master plan dissemination: The main output of the project will be a Master Plan for the future Green Port. To disseminate this plan widely, a specific action plan targeting identified stakeholders such as port authorities, city ports, technological providers etc, will be implemented. In addition to all the project's communication and dissemination channels, including the project partners' channels and contacts, a specific LinkedIn campaign will be rolled out to target the most appropriate audiences. The use of multipliers to promote and share the plan such as other related projects, associations, networks, organisations will be sought. A media campaign with the press through a press release and mentions will be carried out and partners will present the plan at relevant national and international conferences will be planned.</p> <p>The project's final event will also act as a showcase for the Master Plan with specific interactive sessions dedicated to the recommendations included in the plan. World cafés, campfire sessions and hands-on workshops (using innovative methodologies such as Lego Serious Play) are some of the formats that will be planned during the event. The target audiences are port authorities and actors, policymakers, city representatives, technology providers, consultants, energy and mobility communities.</p> <p>Portathon: An online portathon, or open innovation challenge, will be organised during the project to invite European startups (from EIT UM and IE^o individuals, companies and/or organisations to submit innovative solutions and concepts that will address a set of identified problems (stemming from the citizen observatory) and that are not addressed within the scope of the project. The winning participants (or teams) will then be supported through workshops and coaching sessions to help them take their idea further and closer the market. In particular, the value proposition, business model, and marketing aspects will be defined. This activity will build capacity by providing new services in GREENING PORTS and involve a wider audience and stakeholders in the project.</p>	<p>Ensuring continued access to knowledge, contributing to the uptake of green ports</p>

Table 6: Selection of identified/targeted conferences and publications for GREENING PORTS

Conference	Year	Publication	Impact factor
Digitalised Smart Ports	2021	Sensors	3.275
Transport Week	2021	Air Quality, Atmosphere & Health	2.870
Maritime Economy Forum	2021	Atmospheric Pollution Research	3.527
GreenPort Cruise & Congress-Piraeus	2022	Remote Sensing of Environment	9.085
European Geoscience Union -Vienna	2022	Remote Sensing	4.509
ITS European Congress – Lisbon	2023	Urban Climate	3.834
UITP Global Public Transport Summit – Barcelona	2023	Urban Policy and Research	2.000
Transport Research Arena	2023-2025	Sustainable Cities and Society	5.268
European Transport Conference	2022-2025	IEEE Transactions on Intelligent Transportation	6.319
World Conference on Transport Research	2022 and 2025	Maritime Policy & Management	3.152
International Conference on Freight Transport and Logistics	2022-2025	IET Intelligent Transport Systems	2.950
International Conference on Intelligent Transportation Systems	2022-2025	Atmospheric Chemistry and Physics	5.414
SOLUTIONS National Conference on Logistics	2022-2025	Atmospheric Environment	4.012
Copernicus Climate Change Service Assembly	2022-2025	Transportation Research (Part E: Logistics and Transportation Review)	4.690

2.2.2 Exploitation and implementation of results by GREENING PORTS partners

The **GREENING PORTS** Exploitation plan will be drafted in a dedicated WP (WP5) in close collaboration with WP7, communication and dissemination strategy. It will be established at the beginning of the project and updated regularly as a living document. The exploitation plan has the following objectives:

- Identify and manage all project results, ensuring its freedom to operate (IP)
- Coordinate all partners' exploitation claims, protecting innovative results (IPR)
- Define the most adequate business strategies, bringing new products and services to the market, enhancing performance and visibility of European industrials and SMEs. These include new algorithms, digital platforms, energy production assets, training, consulting services...
- Feed the results for further research projects, both at the European and EU member levels, ensuring a maximum of open access to the results.

The exploitation plan will first deal with foreground IP that can be **commercially exploited** by their owners. Furthermore, the exploitation plan will deal with foreground IP that can either be **exploitable in a non-commercial manner** or **commercially exploited by external stakeholders**. If less effort is required to handle such results, it is important to identify potential beneficiaries and define a light exploitation strategy to reach them.

GREENING PORTS Partners Exploitation: The following table presents a first list of results generated by GREENING PORTS and the related exploitation strategies to be delivered. Results are grouped into prototypes, software, data and other. As mentioned before, these strategies will be deeply discussed among project partners and defined during the project. In the case of joint strategies, collaborative workshops will be facilitated by GSH and 3OC with potential owners.

Table 7: GREENING PORTS Exploitable results

Exploitable Results	Partners	IPR Strategy	Foreseen exploitation	Complementary funding
Prototypes				
Master Plan	Invent CG	Trade Secret	Launch a new service and commercialise it throughout Europe	Own Funding
Services 1-6	UNIGE, CG FCT, AT, SINAY, SIARQ WSTL	Trade Secret	SaaS Business to Ports (B2P) 1) Direct selling 2) Licensed for stand alone solution	Own Funding and other research projects
Dashboard	TAS	Copyright	SaaS B2P Direct selling through a spin-off	Own funding
Software (some examples provided. They will all be identified during the project)				

Tool for performance monitoring to reduce GHG emissions	SIARQ	Copyright	B2P 1) Direct selling	Own Funding
Performance forecasting tool	SINAY	Copyright	B2P 1) Direct selling 2) Licensed for stand alone solution 3) Re-use future research	Own Funding and other research projects
Performance notifications and alerts tool	FCT/CERTH	Copyright	B2P 1) Direct selling 2) Licensed for stand alone solution 3) Re-use future research	Own Funding and other research projects
Data				
Data sets collected in ports	All partners involved in pilots	Open	1) Create open license to share data generated 2) Research data openly shared	No funding required
Other (products, courses, videos...)				
Porthaton	3OC	Copyright	B2P 1) Launch a turnkey service for port authorities	Own Funding
Green Ports courses & training	UNIGE, CyI HGG,	Open access	A training offer for enhancing the skills for green ports (civil drones use, environment & CO2 reduction in ports, law of the sea & environmental law, etc.)	Own Funding
Short beginner videos	UNIGE	Open	Short videos for delivering beginner level instructions to use the proposed services Provided with services	No funding required
Monitoring of sulphur content of marine fuels	CyI	Trade Secret	B2P A new service in Partnership with private SME (e.g. ALTUS, https://altus-lsa.com/)	Own Funding & other EMSA tender

GREENING PORTS Business plan: The basis for implementation of results at **GREENING PORTS** is the strong demonstration focus of the project. About 37% of the total budget (WP1, WP3, WP5, WP6, WP7) is dedicated to demonstrating the technical and economic feasibility of **GREENING PORTS**. The demonstration sites have been chosen to be replicable, and scalability is one of the main focuses of the project. The technology providers are leaders of the market and can use existing selling structures. Indeed, the strong involvement of **GREENING PORTS** partners in national, European, and global networks will foster this approach. Finally, the support to establish an adapted framework for demonstration will increase market uptake.

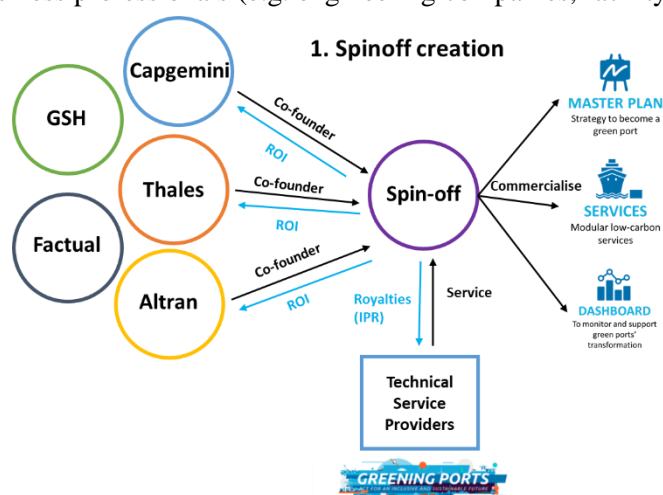
Market potential: **GREENING PORTS** will initially address the ports of the European Union - which have a “greening” component in their strategy, and which will be able to benefit from significant public funding. Medium-sized ports (turnover over € 20m per year, i.e. the 70+ “core network ports” out of the 1100 ports in Europe) will be our priority prospects for replicability. In a second time, the 300+ main ports (95% of the EU merchandises, included in TEN-T) which are essential for the proper functioning of the internal EU market should be considered. Other transport hubs will be studied as airports or train stations in the scaleup and replicability analysis, as per its similar characteristics, the **GREENING PORTS** solutions could be commercially viable too for them.

International market: The prime target market pool of **GREENING PORTS’** solution is the European and even at this stage we have interest from Russia and China, with support letters for each. Of second priority are international markets such as the USA, Canada and Latin America (native French and Spanish speaking partners in the project). Penetration to other wide markets, like the fast growing Asian-Pacific market will also be examined as part of the post-project exploitation during **GREENING PORTS’** implementation since there is an open discussion with the Ocean University of China.

Customer segments: The main categories of potential customers and/or users of the proposed solution include: Port Authorities, port businesses owners and managers, port business professionals (e.g. engineering companies, facility managers).

Exploitation strategy: Two major options are envisaged for the exploitation and commercialisation of the results:

1) Spin-off creation: CG, TAS, AT, FCT and GSH as initial investors and co-founders of the spinoff will ensure the initial launching and operations of the startup. This entity will be in charge of the commercialisation of the three main solutions of the project and the IP owners of the services will act as service providers. Its remuneration on royalties will be agreed during the **GREENING PORTS** project. The spin-off will work as commercial umbrella facilitating the sales actions and secure the post-project sustainability, using the project commercial partners (technological and SMEs) to act as distributors.



2) Joint ventures: diverse joint ventures could be envisaged for the commercialisation of the different services: FCT, SINAY for mobility and logistic services, SIARQ, CyI for Environmental services, AT, SIARQ for energy services. TAS for Dashboard. The configuration is similar to the model above (as if there were various ‘spin-offs that transfer business to each other), in which the technical service providers will ensure the provision of its services to have a complete offer. In this case, each of the participants is responsible for profits, losses, and costs associated with it. However, the venture is its own entity, separate from the participants' other business interests.

Business model: As mentioned before, **GREENING PORTS** offers three types of solutions 1) a master plan for ports’ green transformation, 2) portfolio of services to implement the master plan, 3) dashboard to monitor and implement the whole strategy. Business model innovation will be the object of a deep investigation in WP5 and different characteristics will be explored to find the most adapted BM, such as ownership, partnerships, revenue models, compensation strategies, cost structure, etc. Four different business model archetypes have been already identified, as pictured hereafter.

Table 8: **GREENING PORTS** Business Models

Solutions	BM	Revenue Model	Value Proposition
Master Plan	BM1: Consulting	Upfront payment + Regular payments vs milestones	Delivery of Master Plan strategy ad-hoc for Port
Services + Dashboard	BM2: Pick & Mix	Yearly subscription	Flexible implementation & monitoring of MP
Services + Dashboard	BM3: Freemium	Free functionalities + Paid additional features	Trustable implementation & monitoring of MP
Services + Dashboard	BM4: Performance Based	Yearly subscription with ensured performance	Low-risk implementation & monitoring of MP

BM1: Consulting. This answers to the traditional consulting model, in which the service provider is paid with an upfront payment and regular payments during the provision of the service with milestones.

BM2: Pick and mix. The model of the offered service “pick and mix” from the inventory (WP5) scalable/modular: As example: i) offer as a full service (SaaS) based on the example of the Lighthouse **GREENING PORTS’** platform/year, ii) offer as “pick and mix” per one initiative (Tool for performance monitoring to reduce the GHG emissions)/year (SW), iii) offer as “pick and mix” for a bundle of three services (Tool for performance monitoring to reduce the GHG emissions, Performance forecasting tool, Performance notifications & alerts tool (SW)) / year. A short-term “free trial” will be available for specific services (e.g. SW).

BM3. Freemium. In this case, following a pricing strategy by which a basic product e.g. Tool for performance monitoring to reduce the GHG emissions is provided free of charge, but money (a premium) is charged for additional features, services to expand the functionality tailor-made to the need of a new customer port.

BM4. Performance-based. Similarly to energy performance contracts, this BM aims at ensuring a decrease of GHG emissions for the port set in the contract. The risk is borne by the service provider, and the port has a contract in which the GHG reduction is ensured by the performance contract.

Hardware & sensors. The hardware units e.g. sensors, needed in each case will be listed and offered as included in the sales contract (as use per service) or can be bought preferably from the local market (this will give expansion in more businesses and job creation locally) but always following the **GREENING PORTS'** specs. Also, the hardware handling the data can be as a cloud service offered embedded or can be at the port authority premises (not included in the contract).

The final choice of the business model strategy will follow cost effective reasons: To match market & user needs businesswise in a cost-effective manner **GREENING PORTS'** partners are examining variable alternatives at individual level or joint schemes. A wide spectrum of alternatives is considered such as provision of the integrated software solution; offering modules separately (road mapping tool, performance notifications and alerts, etc.); provision of tools for GHG emissions reduction performance verification and credibility separately, etc. Also, licenced solution, SaaS, and other revenue models will be studied in detail during the project implementation, along with the potential establishment of a network of national/ regional sales representatives. The experience gained from the interaction with the project stakeholders, solution development, the IPR management and the project pilots will provide valuable insights that will shape the final business exploitation scenarios.

Competitive analysis: There is no transnational or cross-sectoral offer (industry, consulting, energy, transport) in the market with the same functionalities as the **GREENING PORTS** tool. Among the few potential competitors, we can thus note the British initiative "GreenPort.com" which aims to raise awareness in the sector and offer good practices, "Swarco" which focuses solely on mobility (Intelligent Transport System) and some firm initiatives. On going H2020 projects currently tackle the port ecosystem, among them PIXEL, which is exploring interoperability technologies through IoT to reduce environmental impact. Hereafter an initial table integrating similar tools to **GREENING PORTS** and its functionalities. An in-depth analysis will be done in WP5 to ensure the replicability to other ports.

Table 9 Competitors Analysis²⁸

Functionalities	GreenPort.com ²⁹	Swarco ³⁰	H2020 Port Forward ³¹	H2020 -H2 PORTS ³²	H2020 PROMOTioN ³³	GREENING PORTS
Cross-sectoral	Awareness, dissemination, practices' exchange	Transport for logistics	ICT solutions, green technologies for freight mobility	Hydrogen technologies in port handling equipment	Offshore wind technologies	Industry, consulting, energy, mobility, traffic flow, logistics, buildings, environment, communication,
Performance monitoring	No	Traffic flow only	Freight flows only	For hydrogen only	For wind turbines only	For energy, logistics, traffic, building, environment communication (5G, IoT)
Forecast & scenarios	Yes	No	No	No	No	Yes
Integration of space & drones data	No	No	Drones only	No	No	Yes
Real Time Adaptation	No	Yes	No	No	No	Yes
Legal (1) economic (2), social (3) and sustainable (4) environmental (5) Impact assessment	No	No	2, 3	1, 2	Yes	1, 2, 3, 4
Regulation & Standards	Yes	Yes, ISO 45001 standard, Cyber	Yes	Yes	Yes	Yes

²⁸ Source: online search providing indicative information on projects'

²⁹ <https://www.greenport.com/>

³⁰ <https://www.swarco.com/stories/greener-ports-its>

³¹ <https://www.portforward-project.eu>

³² <https://h2ports.eu/>

³³ <https://www.promotion-offshore.net/>

Commercialisation strategy: The master plan, the portfolio of 6 services and the dashboard will be tested in four different living environments within this project. A dedicated WP is planned to prepare its market entry and scaleup strategy (WP5) where potential ports' early adopters will be consulted to get feedback on the business models and services, regulatory requirements will be assessed and IPR strategies defined. Key partners and stakeholders for implementation will be identified and approached. In collaboration with the other Work Packages, **GREENING PORTS** will demonstrate that both technical and financial risks are low enough for large scale investments in other EU medium ports. At the end of **GREENING PORTS** project, estimated at the end of 2026, the 3 solutions developed will reach TRL 7-8. The estimated timeline for the full-scale commercialisation and market penetration is depicted in the following figure.

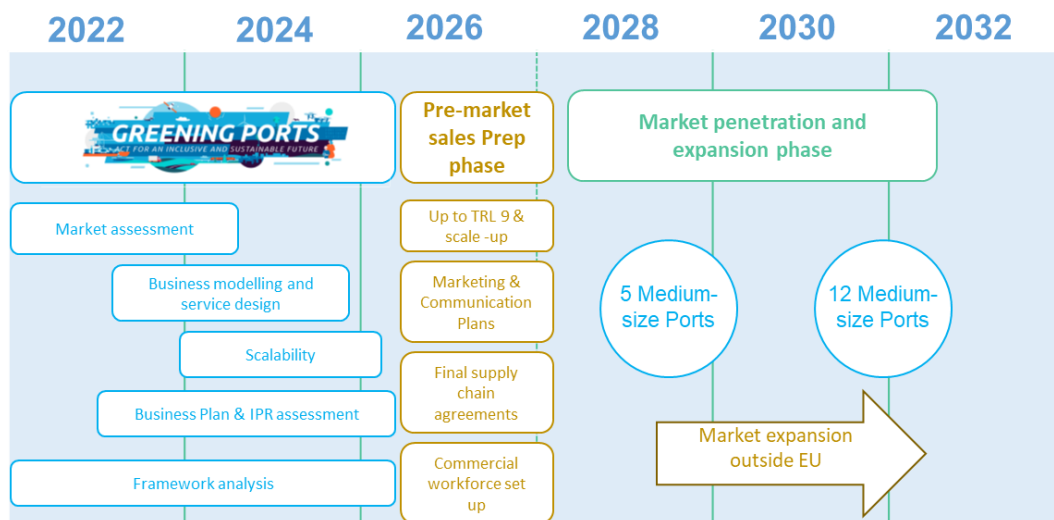


Figure 11 Commercialisation and market penetration timeline

The commercialisation of the **GREENING PORTS** tools is targeted in 2027. This delay between the end of the project and the actual commercialization comprises the full-scale commercialisation phase. This phase will consist in finalising the potential legal requirements issues, contracts between partners, approach and communication towards potential customers, final design of the offer, etc.

There are two clear phases:

1. **Pre-market Sales Preparatory phase (mid- to end 2026):** this is the step related to actions to prepare custom offers, tune cost and enable the creation and structuration of different departments. Market strategies and commercial plans will be consolidated. On the human resources side, the people recruitment and training will start (internal to the consortium companies preferably). Final agreements of supply chain and involvement of industrial stakeholders and with the lighthouse and fellow ports to continue the business collaboration after the project.
2. **Market Penetration and Expansion phase (2027 onwards):** A workforce will be established to work on improvements, standardisation to maximise efficiency, to ensure the maximum quality and a lean approach for innovation. This phase will include deployment of a full production strategy for the **GREENING PORTS** services (software and hardware) according to the sales plans developed in the project. The commercialisation phase for **GREENING PORTS** at the proposal phase includes targets to reach 5 ports in 2 years and 12 ports in 5 years.

The scalability of the solutions will be eased by the industrial involvement in the project and dedicated and user-centred marketing strategies, as well as participating in different sustainable ports events and fairs to provide visibility to our ports and solutions. Expansion to international countries, outside Europe is foreseen for the third year (2030). The targeted areas will be North America, China, Russia... (contacts have already been established at the proposal phase)

Financial projection:

The following figures are sales projections after the project ends. The following assumptions have been taken to propose a business plan at the proposal phase:

- 1) the average price of the master plan is 150 000€
- 2) the average price per dashboard + services is 500 000€ (upfront) + 100 000€ (yearly subscription, covering the software/SaaS solution and infrastructure costs, maintenance, training, etc.)
- 3) average salaries for engineers and commercial personal costs in the range of 50-60k€
- 4) for the indirect expenses the Capgemini ratio is used

All these figures are estimation at this stage and will be carefully studied in WP5 and validated in WP2-3. The pilots will allow to validate the master plan, services and dashboard characteristics, the service design and the business model and business plan figures.

	Y0 (2026)	Y1 (2027)	Y2 (2028)	Y3 (2029)
	Last 6M			
Sales volume Master Plan		1	3	7
Sales volume Services + Dashboard		1	2	7
Revenues Master Plan		150 000 €	450 000 €	1 050 000 €
Revenues Services + Dashboard		500 000 €	1 100 000 €	3 800 000 €
TOTAL Revenues		650 000 €	1 550 000 €	4 850 000 €
Staff (People #)	2	3	6	10
Engineering expenses (Labor, prototypes)	135 000 €	202 500 €	405 000 €	675 000 €
Material purchases expenses		62 000 €	120 000 €	200 000 €
Commercial expenses (Advertising, marketing, online purchase fees, commercial activity)	45 000 €	75 000 €	150 000 €	300 000 €
Indirect expenses (offices, structure, IT)	12 899 €	24 329 €	48 372 €	84 203 €
SG&A expenses (legal, certification)	25 425 €	50 850 €	75 000 €	90 000 €
EBIT	218 324 €	235 321 €	751 628 €	3 500 797 €
Cumulative EBIT	218 324 €	16 996 €	768 624 €	4 269 421 €

Figure 12 Business Plan

Research Data Management: The project involves carrying out data collection (in the context of the piloting and validation phase) and a set of large-scale validation tests to assess the technology and effectiveness of the proposed framework in real life conditions, so the consortium will have to comply with all European and national legislation and directives relevant to the country where the data collections are taking place. The collection, processing and transmission of any personal data will be analysed under principles of: i) The recently published General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679)94; ii) The Universal Declaration of Human Rights and the Convention 108 for the Protection of Individuals with Regard to Automatic Processing of Personal Data and iii) the national laws applying its provisions. Any additional regulations at national level that do not fall under the GDPR and apply to data protection or any other sensitive information will also be taken into account. The Port Data Management Plan (PDMP) will detail what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated & preserved. The PDMP will be submitted by M12 (WP3), to be continuously updated until the end of the project, as part of the **GREENING PORTS** Data Cubes.

Intellectual Property and knowledge management and protection General principles: The general principles for handling Knowledge and Intellectual Property Rights within **GREENING PORTS** are stated below and will be settled in the consortium agreement (CA) to be signed at the project start. These principles are in line with H2020 Intellectual Property Rights recommendations. Background and foreground (results) will be clearly identified within the consortium agreement and when applicable, granting of access rights will be clearly specified. Ownership: Each participant will own the foreground it generates. Joint ownership: When the foreground is generated jointly, participants will have to reach an agreement. Rules to do so will be defined in the consortium agreement. Protection, use and dissemination: Results capable of industrial or commercial application must be protected taking into account legitimate interests. Prior notice of dissemination must be given to other participants (not to EC, unless no protection, in which case the latter may request to protect on its own behalf). Any dissemination must indicate the Community financial assistance. Access right: Partners may define the background needed in any manner and may exclude specific background (not necessarily prior to signature of EC grant agreement). It is possible to grant exclusive licences to background and foreground if the other partners waive their access rights and depending on previous agreements. Partners may agree to additional or more favourable access rights than those provided for in the consortium agreement. At a preliminary stage, partners agreed on open access publishing. However, in the future, partners may also opt for gold or green access to peer-reviewed scientific publications. Management of knowledge **GREENING PORTS**

in **GREENING PORTS**: In order to optimise the research and development **GREENING PORTS**, a process of knowledge management will be implemented, whereas by voluntarily participating in the Pilot for Open Research Data, a DMP (Data Management plan and Ethics), fully addressing the lifecycle and public availability of research data generated by the project. This process will provide the consolidation of the knowledge spiral, enable co-operation and will allow for the creation of new knowledge. This process is divided in different steps: First of all, the information will be gathered and shaped. After that, it will be indexed in order to be correctly disseminated. This will be followed by an appropriation period, which provides the creation of new knowledge. Some tools dedicated to knowledge management will be set up to support social interactions, knowledge processing (files will be organised thanks to semantic links, to facilitate future searches) and intelligent distribution of knowledge (push and pull actions to optimise the distribution of knowledge). The **GREENING PORTS** Intellectual Property Rights (IPR) strategy: The IPR strategy and the exploitation management will be handled in the CA. The IPR strategy of the project is an important part of the project exploitation plan. During the project meetings the internal results will be reviewed with the goal of identifying important ideas and defining an individual strategy for the positioning of these ideas in the standardisation and commercialisation processes.

3. *Communication activities*

Communication activities will be closely linked to dissemination objectives. The preparation of the communication action plan will be aligned with the project strategy and will be one of the first tasks to be addressed in WP7. The plan will include the key messages to be conveyed, tools and channels used, the timing of the planned activities, and their geographical level (local, European). It will also provide guidelines for the project's and partners' dissemination activities to maximize the impact of **GREENING PORTS** results.

A draft communication plan is proposed hereafter following a five-step model.



Step 1: WHY – communication objectives

The main communication objectives and goals of **GREENING PORTS**, in addition to the ones listed in section 2.1.1 under dissemination are to raise the project's target audiences' awareness, promote the project's outputs and results, and engage with its target audiences.

Step 2: WHAT - the results to communicate

The message to be communicated will be strongly dependent on the project's lifetime: messages must be adapted to the timing of the project, considering the results generated. The strategy will consider the timing and an adequate correlation between the communication channel, the messages and the targeted audience. In this sense, three dissemination levels have been defined:

- **Level 1: AWARENESS.** The awareness actions that will be carried out in **GREENING PORTS** will follow a three-step engagement plan aiming to generate awareness, social acceptance and open the path to building trust towards ports through improved communication and transparency. This support is essential to overcome the challenges ports are facing.
- **Level 2: PROMOTION.** Promote the results of the project and the Master Plan. These actions mainly take place during Y2-Y4.
- **Level 3: EXPLOITATION.** Prepare the ground for exploitation of project's results. These actions mainly take place at the end of the project.

Step 3: WHO - sharing the responsibilities with all partners

Communication is not a matter of only one partner, each beneficiary will ensure that the information they generate in the project is communicated. All communication activities engaged by the partners must consider the protection of intellectual property rights, confidentiality obligations and the legitimate interests of the owner(s) of the information. Conditions and procedure for communication and dissemination will be reflected in the Consortium Agreement signed by all the consortium members prior to the beginning of the project.

Step 4: HOW - the best channels and tools to get the word out

The tailored actions, messages and tools based on the targeted audiences will be designed and communicated/disseminated through the different channels and actions listed below (see WP7 for detailed descriptions). The following core groups of stakeholders have been introduced in Table 5.

Table 19: Communication actions

Tools Channels	Purpose	Audience	Date	Indicators of success
Public website	The project's public website will be the hub and main channel for information on GREENING PORTS and will aim to reach all of the project's audiences through targeted communication material. It will be relayed on other websites, including those managed by each partner. It will be updated regularly and will contain information on the project scope and objectives, time schedule, activities undertaken and results; public documents produced in the project; agenda of prospective dissemination activities.	All	M1	At least 40,000 views by the end of the project
GREENING PORTS brand: identity & logo,	Creating the project brand, ensuring visibility and coherence among all relevant communication activities. Guidelines will be produced for partners on how and what to communicate about the project (such as example tweets / posts for social media and content for press releases) and descriptions of the project to be included on partners' websites and channels.	All	M3	N/A
Communication support materials	A roll-up and a flyer presenting the project will be produced to communicate on the project at conferences, workshops, events	All	M4 (updated during the project duration)	Number of events where the roll-up was displayed and flyer distributed. At least 6
Social media	GREENING PORTS will draft a strong social media strategy. Social media accounts will be set up and a strategy will be designed to maximise the actions undertaken in the project and engage in a two-way dialogue with the target audiences. LinkedIn campaigns will be planned to reach the target audiences of the project and to promote the awareness raising campaigns and content produced in the project.	All	M1-M54	Total of at least 3k followers
Content	Short videos, infographics, messages/images, news and editorial posts	All	M1-54	Number of interactions/engagement online -at least 1000
Newsletter	A yearly electronic newsletter to inform stakeholders of the project's progress will be distributed. It will include a word from the coordinator, highlights of the work undertaken and results, relevant news, relevant workshops and conferences	Local actors	M1-54	Number of subscribers to the newsletter – at least 200
Factsheets	Factsheets will be produced based on the results of the project and will aim to promote green ports. The following topics have been initially identified. Other topics will be defined during the course of the project: 1. The objectives and challenges of the GREENING PORT project 2. The challenges linked to mid-sized ports	All	M12-54	Number of interactions/engagement online and reach

	<ol style="list-style-type: none"> One factsheet on what defines a green port and the port of the future One factsheet per service area offered by GREENING PORTS (Energy, Mobility & Logistics, Environment) 			
Policy brief	A policy brief summarising the main elements of the Master Plan will be drafted to inform local, regional and European level policy-makers involved in the port/maritime sector on green ports and how they can be achieved	TA4, TA5, TA6, TA7	M50	Number of policymakers reached
Campaigns	Awareness raising campaigns will be rolled out every 6 months. The following initial set of topics to be highlighted have been set. Additional subjects will be defined during the project. <ol style="list-style-type: none"> Ports in facts and numbers (Europe and worldwide) Ports for dummies (how a port is structured and organised) Innovation in ports around the world (technology drivers and smart ports) Ports and environmental issues Ports and mobility issues Ports and citizens GREENING PORT project challenges and objectives GREENING PORT Master Plan 	All	M12-54	Number of interactions/engagement online and reach
Scientific publications	Articles will be published on scientific publications, in particular open access schemes (predefined publications have been set in the table in the section above)	TA4, TA5, TA6, TA7, TA10	M1-60	At least 6 publications
GREENING PORTS Portathon	An open innovation challenge in the form of a “Portathon” will be organised to raise awareness, share knowledge and engage stakeholders. A dedicated website, linked to the project website, will be designed for the Portathon to organise, promote and allow participants to interact and submit their ideas.	TA1, TA2, TA3, TA4, TA5, TA10	M48	Number of submitted ideas
Conferences and events	All partners will actively participate in conferences and events to disseminate the project’s objectives and results. Partners and ports will build on existing events such as Open days that they organise to include sessions or displays on the GREENING PORTS project or organise additional ones	TA4, TA5, TA6, TA7, TA8, TA10	M1-M54	At least 10 events where GREENING PORTS is promoted
Final event	A final event will be organised during the last three months of the project to disseminate the results of GREENING PORTS and the Master plan. The event will take the form of a <i>Bootcamp</i> with interactive learning sessions, and knowledge and experience sharing sessions between the participants, with a view to build capacity and give the right tools to the right people to support them in making European ports greener.	All	M45-M54	70-100 participants

Step 5: HOW GOOD - monitor and evaluate actions

Effective communication and dissemination require considering the expectations of the audience. This can be measured through monitoring tools that analyse and show the impact of the different dissemination actions. This monitoring also allows to validate the success of specific actions and, if the targets listed in the table above are not

achieved, we will implement corrective actions. The Dissemination and Communication Plan will be delivered at M3 and updated each year.

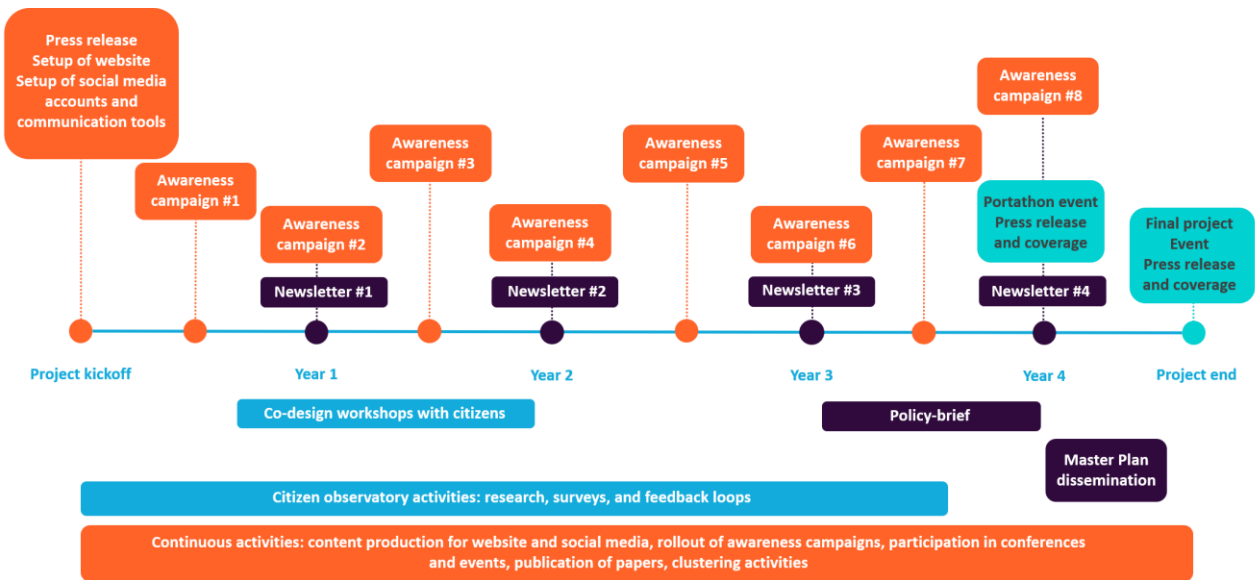


Figure 13 Dissemination and communications actions

3. Implementation

3.1 Work plan — Work packages, deliverables

As brief presentation of the overall structure

Following SAFe inspired methodology as introduced in Section 1, the project is implemented through activities performed in seven work packages as described in the figure below. The aim is to ensure a smooth task management and coordination with partners (WP0); to assess carbon footprint and build a vision of services roadmap for lighthouse and ports (WP1); to develop a robust portfolio of services preparing the service to be operational in relevant environment (WP2); to test and demonstrate specific services prototype in real-world environment in lighthouse and fellow ports (WP3); to assess and enhance the effectiveness of the services in lighthouse and fellow ports (WP4); to ensure **GREENING PORTS** scaling up and sustainability by (WP5) maximising the use of best practises from other activities for a better replicability to EU and international ports and optimize the exploitation beyond the project duration and (WP6) to provide legal, economic, financial and standards frameworks; and finally to boost the dissemination, communications and user engagement of the project results (WP7).

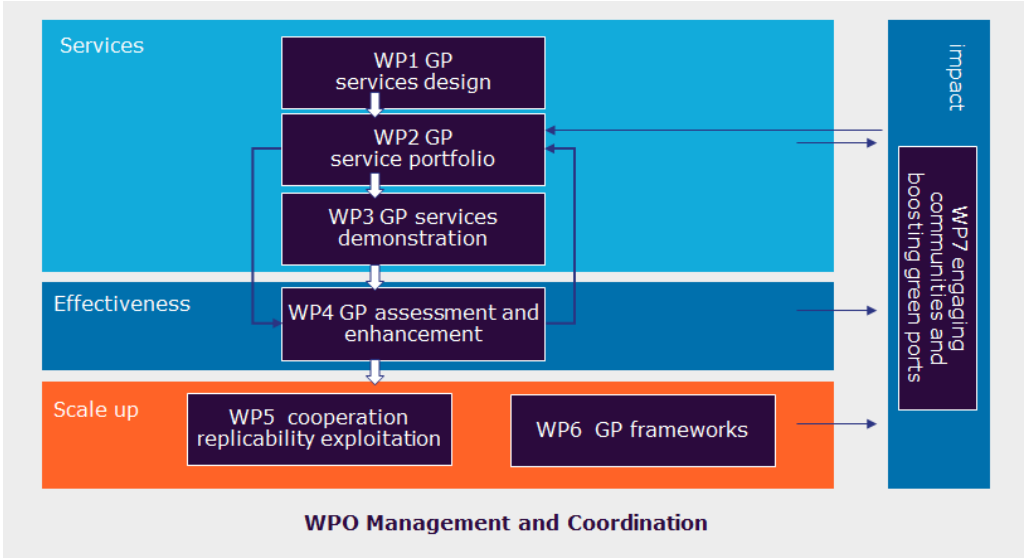


Figure 14 Workpackages Dependencies

The dependencies and timing of the different WP are presented in Figure 8 and Figure 9., the project work packages are detailed in Table 3.1b, the work packages are described in Table 3.2. Major deliverables are listed in Table 3.1.c.

Table 3.1a: List of Work Packages

WP #	Work Package Title	Lead Participant #	Lead Participant Short Name	Total PM	Start Month	End month
0	Management	1	CG	146.5	1	54
1	Services Design	14	INVENT	252	1	54
2	Services Implementation	7	UNIGE	728	3	54
3	Services Demonstrations	18	AT	958.5	9	54
4	Assessment & Enhancement	12	TAS	317	6	54
5	Cooperation, Replicability & Exploitation	16	GSH	100	1	54
6	Frameworks	11	HGG	103	1	54
7	Engaging community and boosting GREENING PORTS	13	3OC	120	1	54
TOTAL Person x Month				2725		

Table 3.1b: Work package description
WP0 – Management

WP #	0						Start month 1										End month 54							
WP title	Management										Lead Beneficiary: CG													
Participant #	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20				
Short name	CG	PGA	KSSA	PAS	CTL	CYI	UNIGE	KU	CERTH	CNRS	HGG	TAS	3OC	INVENT	DNVGL	GSH	DEMS	AT	FCT	ONAIR				
Person-months	108	3	3	3	2	1	3	0,5	0.5	0.5	3	3	3	1	0.5	3	1	3	0.5	0.5				
Participant #	#21	#22	#23	#24	#25	#26																		
Short name	CTI	SINAY	SIARQ	BSC	FBT	WRSL																		
Person-months	0.5	0.5	0.5	0.5	0.5	1																		

Objectives

This work package aims at carrying out an effective management of the project in order to:

- Coordinate and organize management activities
- Ensure an efficient interface with EC, facilitate the consultation of Advisory Panel members
- Manage financial activities along the project progress
- Plan and schedule activities for the project
- Organize documentation control (technical and project activity) and to prepare deliveries (doc and components)
- Manage actions & risks
- Ensure the interaction with Innovation & Exploitation Management Board and Advisory Panel

Description of work

This WP is led by Capgemini (S. Mely and C. Saït, with support of S. Nouvellon.) which will be responsible for all contractual, administrative and legal aspects of the project. The following is a list of the tasks required to achieve the objectives of this Work Package. The high-level Management Structure as well as the individual roles and responsibilities within this structure are explained in Section 3.2 of the proposal. It also includes a brief overview of the most important management procedures of the project, which will be further defined in the early months

Task 0.1 – Administrative contractual and financial coordination – Period: M1-M54- Leader: CG

This task will establish the corresponding procedures, tools and methodologies to enable an effective project management, including administrative and financial management. It will also coordinate the timely production of deliverables, organize the kick-off meeting and reviews, and organize and manage audits requested by the European Commission. On a 6-month basis, the project coordinator will monitor resources usage, producing internal use of resources reports to ensure the project resources expenditure is in track with the work progress. Given the key role of project management in the success of the **GREENING PORTS** project, the Project Manager will be backed up by Capgemini Project Management Office who will follow closely the project activities and will be available to take over the project management tasks at any time should a problem occur or additional human resources will be needed at some specific point to manage the project.

Task 0.2 Technical Coordination Period: M1-M54- Leader: CG

Led by the Technical Manager Stéphane Mely this task will perform the technical coordination of the project by monitoring the progress of the Work Packages, technical coordination of meetings, appointing reviewers to assess the quality of the deliverables before their delivery to the EC, and solving technical conflicts. The coordinator should manage the technical resources needed for the project and shared between the different partners. She ensures the homogeneity of the solution and should consider the technical Advisory Board recommendations. A technical status will be included into the progress reports. The coordinator will draw attention and check the licenses handled into the project. For the project's components to be deployed as open source, it is important to check the non-contamination by another license.

Task 0.3 Internal communication, Quality and Risk Management M1-M54- Leader: CG

In this task, we will determine the appropriate strategy to ensure clear communication channels between all partners and the EC in order to facilitate the exchange of critical project documentation and news and to encourage participation in the decision-making process. The task will require defining and maintaining internal collaborative tools for sharing documentation and communicating work status. One of the outcomes of this task will be a Project Portal (shared workspace) as well as a series of distribution lists along with the organization of a monthly teleconference for the GREENING PORTS Consortium. The Coordinator will be the single contact point for the EC and for strategic issues outside the project. This task will ensure the appropriate follow-up of specific obligations deriving from the EC contract, in terms of reporting (financial and scientific results), communication and general management procedures. The coordinator will inform the EC of project achievements and of any deviations from the agreed plans. In case of major difficulty, the coordinator will undertake a dialogue with the EC in order to find appropriate solutions. In this task, we will also define and implement the appropriate quality assurance processes that ensure accurate documentation, reporting and justification of the work being carried out. A process will be developed with appropriate tools to ensure that the deliverables have been reviewed by a broad spectrum of individuals against a well-defined set of criteria. Moreover, we will determine the minimum level of quality required for presentation of the official outcomes of the project to the EC. The high-level principles guiding these procedures will be agreed to at the start of the project at the Kick-off Meeting. The administrative project management procedures defined in Task 0.1, quality assurance and risk management processes will be defined in D0.1. The coordinator commits in maintaining an up to date Action Items List (AIL) and identify the potential risks. The coordinator should be in charge to mitigate the risks mitigation and propose solution as soon as possible.

Task 0.4 Innovation & Exploitation and Advisory Panel Management and M1-M54- Leader: CG

In order to maximise the adoption of the GREENING PORTS services within the port consortium and beyond the consortium where the services will find their path towards the market, a proper innovation and exploitation management plan is of paramount importance. The Innovation & Exploitation Management Board (IEMB) will work closely with the project coordinator and the consortium exploitation team to ensure a proper exploitation path as explained in section 2.2 and defined in WP5. Innovation & Exploitation management processes include both day-to-day management of knowledge and IPR issues and the iterative creation of exploitation plan and technology roadmaps. Being more precise, that will include: (1) Creation of an IPR repository; (2) monitor IPR compliance with H2020 and Consortium Agreement rules; (3) facilitate any related conflict; (4) facilitate the creation of commercial agreements between partners leading to joint exploitation after the end of the project; (5) monitor the project to guarantee consistency between technical and marketing choices; (6) monitor the market during the whole duration of the project,

particularly concerning evolution of the technology, potential customers and existing and emerging competitors; (7) alert the Executive Board in case of inconsistencies with the exploitation goals; and (8) plan initiatives that combine technical and exploitation objectives to create business models for defining and exploitation path of most relevant innovations within the project.

An external Advisory Panel (AP) will be established early in the project, bringing together well-distinguished stakeholders that will liaise with the consortium to provide an external view of the progress and results of the project. The AP will provide advice and feedback on the activities and results of **GREENING PORTS**, in particular on Exploitation Plan and Master Plan. This group will be composed of maximum 5 members and will be formed by internationally recognized experts who either are directly involved in Port Ecosystems, Urban Mobility, Energy or are interested in the real-life benefits that the green shift would bring to their specific sector. Their expertise and independent assessment are expected to guide the project in accelerating the societal acceptance and market uptake of demonstrated services. On top of regular online meetings, the major interactions of the AG and **GREENING PORTS** will take place during the 2 technical workshops that will be organized in conjunction to the general assembly of the project.

Deliverables (brief description, **leader**, and month of delivery)

D 0.1: Kick-off meeting report. (**Lead: CG, M1**)

D 0.2: Progress Report Public Report. (**Lead: CG, M06 M12, M18, M24, M30, M42, M48**)

D 0.3: Final Public Report. (**Lead: CG, M54**)

WP1 – Greening Ports Services Design

WP #	1						Start month 1								End month 54							
WP title	Greening Ports Services Design										Lead Beneficiary: INVENT											
Participant #	#1	#2	#3	#4	#5	#6	#7	#13	#14	#16	#18	#19										
Short name	CG	PGA	KSSA	PAS	CTL	CYI	UNIGE	3OC	INVENT	GSH	AT	FCT										
Person-months	4	20	12	15	10	30	21	4	87	7	26	4										

Objectives The main objectives of this work package (WP) are to:

- Assess the environmental footprint of the ports (carbon, waste, air, water...)
- Identify key levers to improve the environmental footprint, in line with ECOPORT guidelines
- Build the vision and the roadmap for the lighthouse and fellow ports to 2030, 2040 and 2050
- Define the target governance to animate the ecosystem around the Green Port

Description of work

Task 1.1: Port diagnostic Duration: M1-M4 / Participants: Invent, AT

The task aims at building a diagnosis of the current situation of the port regarding "Green" and "Smart" components with the port authority and the key players in the list of port stakeholders. The main activities are:

- Interview with ~20+ stakeholders for each port using a questionnaire template on Green / Smart maturity
- Diagnose and measure the current carbon footprint of the port area to ensure better monitoring

Task 1.2: Green Port Design; Duration: M2-M12 / Participants: Invent, PGA, KSSA, PAS, CTL, AT, Unige, GSH

The task aims at building a common vision to decarbonate the ports and elaborate a roadmap for each port. Activities will be based on inputs from Task 1.1, benchmark and ideation workshops with the different partners. Details are as following:

- Identify structuring market & regulatory trends, technology levers and proven Green and Smart best practices in Europe / around the world
- Identification of Green / Smart use cases that have proved their worth beyond communication
- Definition of the limit of the port systems and data collection on raw material, energy, mobility, logistics, industry, waste, end of life management, etc.
- Development of a generic port modelling system adaptive depending on the port use case
- Definition of the limit of the port systems and data collection on raw material, energy, mobility, logistics, industry, waste, end of life management, etc.
- Development of a generic port modelling system adaptive depending on the port use case
- Build and detail the Green Port strategy: ambition and vision; decarbonisation strategy; main use cases according to different "Green" axes (data, energy, mobility, logistics, industry, waste, management ...)
- Prioritize higher-value Green use cases for the activities of the port area according to the different axes (data, energy, mobility, waste, logistics, industry, management, etc.)

Task 1.3. - Green Port Development Strategy; Duration: M5-M12 / Participants: UNIGE, Invent

- Document each of the selected Green use cases: business expectations, prerequisites, beneficiaries (port place stakeholders), potential partners (external actors), human and financial resources required (investment strategy), way of implementation (agile project methodology)
- Build a first macro business case for each use case.

Task 1.4 Nature-based solutions & circular economy; Duration: M2-M10 / Participants: GSH

Nature Based Solutions (NBS) – green infrastructure installations such as green roofs, tree pits and swales – can yield multiple port area benefits. These include reduction of water and air pollution, mitigation of flood risk and heat islands, as well as provision of areas for recreation and urban agriculture. The ports are geographically part of the cities and our approach is to “build” a Sustainable, Resilient and Cost-Efficient Development and then monitor and Blue Green solutions (BGS) impact regarding social and environmental results. To systematically implement an innovative NBS-based urban planning methodology which is designed to create spatial and functional conditions that will enhance not only the Public Health (PH) and Wellbeing (WB) but also the urban metabolism, the social cohesion and the resilience of cities to Climate Change (CC) and serve to the DE-carbonization. To replicate and demonstrate corresponding advantages of innovations via mentoring and coaching.

Sub Task 1.4.1 Circular Economy - Recycling

Per-person on-board food waste generation is typically larger than land based, with values ranging from 1.4 and 2.4 kg/pers.d, nevertheless data availability is poor. Disposal of this food waste to sea is not always possible due to restrictions imposed by MARPOL 73/78 and other marine pollution control instruments. Solutions range from on-board incineration to truck transfer from the port to local solid waste management plants and typically bear a great energy and environmental footprint. The obligation of Member States for source separation and re-use or recycling to at least 50% by weight further complicates the problem. The greener alternative of the valorization of this biowaste as compost or biogas has been proposed but the process is challenging due to logistics and space considerations.

We focus on the following tasks:

- Review existing knowledge and address knowledge gaps on on-board food waste generation and disposal.
- Design and test on-board food waste generation monitoring solutions taking advantage of new IT solutions
- Design and test combinations of innovative on-board technologies and management schemes at pilot scale for 1) generation of biogas 2) compost production) and for floating waste management at pilot scale (e.g. continuous waste processing vessel) including green energy generation and supply.
- Assess the impact of the proposed technologies and include them in the Master Plan for the future Green Port, addressing the associated investment/cost implications.

Sub Task 1.4.2 Nature-based solutions

To systematically implement an innovative NBS-based urban planning methodology, based on the Blue Green Solutions (BGS) paradigm, designed to create conditions that will enhance not only the PH and WB of visitors, workers, citizens, but also contribute to the port metabolism, the social cohesion and the resilience of the port cities to Climate Change (CC) and natural disasters eg. flooding.

- To Reduce negative externalities: Need for low impact nature-based designs to minimize and regulate urban environments and minimize air pollution, extreme heat events, water scarcity, flooding, loss of biodiversity, and reduced access to green spaces.
- To integrate passive systems that maximise natural daylighting and ventilation. Earth Observation imagery is a perfect tool to assist in the design, such as positioning of the existing building roof, in order to maximise natural ventilation, solar energy and energy generation from e.g. bio reactive facades (algal biomass).
- To build an intervention-aimed livability model rooted in community needs and engaging community diverse potentials. We will follow a three-pronged approach: 1) ensuring the relevance of interventions to specific communities' needs and preferences; 2) reflecting visitors' /workers/ residents/users' voice in the planning process; 3) consolidating the sustainability of project outcomes by fostering a sense of ownership among citizens/users across the space technology supply chain.
- To re-designing and transforming port open spaces, while promoting new governance (reconsidering the jurisdictions and functions in ports and the actual needs of the citizens – co-governance/co-ownership) and new financing models (including crowdfunding).
- To design customised spatial solutions for case study Pilot Port and then monitor and assess their impact mostly regarding PH and WB, also considering social and environmental aspects. We aim to utilise traditional methods (questionnaires/interviews), combining them by data collected through behavioral games and mobile questionnaires. Remote sensing and sensor networks will monitor microclimate, biodiversity, pollution, Port Urban Heat Island (UHI), etc.

Task 1.5.– Governance of stakeholders Port Taskforce Duration: M1-M54 / Participants: Invent, PGA SA, KSSA, PAS, CTL, AT, Unige, GSH, CyI, FACTUAL, 3OCLOCK, CG
To orchestrate the deployment of the smart and sustainable services in each port, between each partners and connecting with public stakeholders :

- Map stakeholder in each port
- Benchmark successful governance models from similar consortium models, analyze the best practices and identify transferable models to the Port Taskforce
- Set up the governance and launch committees incl. Digital Services (Capgemini); Energy & Logistics (UNIGE); Environmental Monitoring (Cyprus Institute); Mobility (Factual); Citizen Participatory Approach (3oClock)

Deliverables

- D1.1: Carbon footprint assessment (Lead **Invent**, AT, M4)
- D1.2: Roadmap of services for each port to 2026, 2030, 2040 and 2050 (Lead **Invent**, M12)
- D1.3: Associated business case and recommendation for each identified services (Lead **UNIGE**, M12)
- D1.4: Design, Implementation and Monitoring of Circular Economy – (Lead **GSH**, M6)
- D1.5: Mapping governance and stakeholders (Lead **Invent**, M12)

WP2 – Greening Ports services implementation

WP #	2						Start month 3								End month 54					
WP title	Greening Ports Services implementation										Lead Beneficiary: UNIGE									
Participant #	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#15	#17	#18	#19	#20	#22	#23	#24	#26	
Short name	CG	PGA	KSSA	PAS	CTL	CYI	UNIGE	KU	CERTH	CNRS	DNVGL	DEMS	AT	FCT	ONAIR	SINAY	SIARQ	BSC	WRSL	
Person-months	7	36	12	8	7	66	180	74	36	23	28	36	51	16	40	31	35	40	5	

Objectives to identify and develop technological solutions able to foster the transition toward a CO2 neutral port environment. WP effort will

- perform the survey and the match between available technologies and port needs, addressed in WP1.
- set up several services addressing CO2 neutrality in the ports eco-system.
- design the selected demonstration cases that will be implemented in WP3 and WP4.

For each service, achievable performance, KPIs and cost structure are provided. Identified technologies and solutions are part of the consortium portfolio, a development plan is required to customize the solutions for a generic port use in

order to achieve TRL 6, where the technology has a fully functional prototype or representational model. The work package will address mainly CO2 issues, however the services will also address most of the top ten priorities listed by European ports, namely: air quality, climate change, energy consumption, noise, relation with the port community, ship waste, water quality, port waste, dredging and land use.

Task 2.1 - Low Carbon Energy Production, Storage, Supply and Demand – Period: M3-M54 - Leader: ALTRAN-
Participants: ALTRAN, UNIGE, Klaipeda University, SIARQ, CERTH

More technical information on Task 2.1 are provided in Section 4-5 under section task leader role

The purpose of this task is to propose a panel of technological solutions to mitigate carbon emission in ports. Sources of CO2 emission in ports are various: traffic, port shuttles, towing, cold ironing, industry, heating and powering of buildings, and will all be addressed. The object is also to assess the actual situation of the different port energy conditions (energy audit) and assess the potential of the new technologies. All these technologies will be implemented in a simulation software that will help to decide the best solution which should be deployed in accordance with the environment of each port. The following subtask will be led:

2.1.1 Hybrid or electrical boats and land vehicles (Klaipeda University, CERTH, UNIGE, DNVGL)

2.1.2 Green buildings (UNIGE, Altran)

2.1.3 Green cold ironing (UNIGE, Altran)

2.1.4 Low carbon energy production and storage (Altran, SIARQ, UNIGE)

Task 2.2 - Green Smart Logistics – Period: M3-M54 - Leader: UNIGE- Participants: SINAY, CG, CERTH

More technical information on Task 2.2 are provided in Section 4-5 under task leader role in the project

The task will focus on the provision of services related to smart logistics operations and the analysis of their impacts in terms of internal port logistics organisation and related KPIs. The preliminary activity of the task will be the evaluation of key operational, social, and economic aspects that will be impacted by the introduction of smart logistics operations (D.2.2.1); this activity, led by Unige, is considered preparatory for the introduction of smart logistics services and it consists in mapping the internal port processes that will be later optimised. After this, the task will be centred around 3 key pillars. Each pillar capable of reducing the environmental footprint of port operations at current status quo in terms of deployed hard-technologies and infrastructure).

2.2.1 Simulation and optimisation of port logistics operations. (UNIGE, CG, SINAY)

2.2.2 Impact of smart contracts in the smart logistics (UNIGE)

2.2.3 Smart business models and operational impact UNIGE CERTH

Task 2.3 - Seamless and efficient logistic operation – Period: M3-M54 - Leader: UNIGE- Participants: CAPGEMINI, CERTH, FACTUAL

More technical information on Task 2.3 are provided in Section 4-5 under section task leader role

2.3.1 to understanding port-city relations and relevant transport and logistics networks. UNIGE

2.3.2 to evaluate operational and economic impacts of the technology implementation. CERTH

2.3.3 to analyse traffic flow from/ to the port with macroscopic models and tools. CG, FCT

2.3.4 to analyse traffic flow in terms of activities at the gates with microscopic models and tools. UNIGE

2.3.5 to define procedure for port traffic flows management. CG

Task 2.4 - Tools for multimodal and efficient access – Period: M3-M54 - Leader: FCT- Participants: UNIGE, CERTH

More technical information on Task 2.4 are provided in Section 4-5 under section “ task leader role ”

2.4.1 On-demand sustainable transport service from/to the city FCT, UNIGE, CERTH

2.4.2 Development of smart park zones for trucks UNIGE, CERTH

Task 2.5 - Green ports energy simulations – Period: M3-M54 - Leader: UNIGE - Participants: UNIGE, DNV-GL, On Air, Port of Venice, Port of Klaipeda, CG DEMS, Wartsila

More technical information on Task 2.5 are provided in Section 4-5 under section “task leader role “

This task will address two main challenges, the continuous energy optimization of port activities (shore and waterborne), with particular reference to the port demonstration cases, and the evaluation of the long-term effectiveness of the proposed demonstrations:

2.5.1 Multi energy hub Simulation UNIGE, WSTL, DEMS DNV GL

2.5.2 Availability & Maintainability simulations UNIGE

Task 2.6 - Environmental Services – Period: M3-M54 Leader: CyI - Participants: UNIGE, SINAY, SIARQ, CNRS, CERTH, BSC, KU

More technical information on Task 2.6 are provided in Section 4-5 under section " task leader role "

A comprehensive suite of technological solutions (TRL>6) will be further adapted/combined here (Task2.6) and deployed in lighthouse/fellow ports (WP3) in order to assess (in WP4) the positive environmental impacts of (energy/mobility) mitigations measures.

2.6.1. Water Pollution Monitoring services (SINAY, CERTH) (M3-M18)

2.6.2. Noise Pollution Monitoring services (UNIGE, SIARQ, CERTH) (M3-M30)

2.6.3. Air Quality monitoring services (CyI, SINAY, SIARQ, CERTH, KU) (M3-M18)

2.6.4. Air Pollution Emission Mapping (CNRS, CyI, KU) (M3-M18)

2.6.5. Air Pollution emission control & inventory (BSC, CNRS, CyI) (M3-M36)

Task 2.7 – Green ICT Architecture for Ports – Period: M3-M54; Leader: UNIGE - Participants: CG, ONAIR, SINAY

This task's main general objective is to design the ICT reference architecture for supporting the port evolution towards increased environmental compatibility and a higher level of efficiency and effectiveness. This architecture includes wired and wireless networking facilities, Internet of Things (IoT) support, and, more in general, the sensors and actuators management infrastructure, the computational infrastructure (including cloud, Machine to Machine, and edge computing approaches), and the cybersecurity management structure

Task 2.7.1. Monitoring architecture (: CAPGEMINI)

Task 2.7.2. Network architecture (UNIGE)

Task 2.7.3. Computational architecture (CAPGEMINI)

Task 2.7.4. Cyber Security (UNIGE)

Deliverables

D2.1i -Low carbon energy production, storage, supply and demand port demonstrations assessment and evaluation
UNIGE, M24 update at M54

D2.1.2- Energy chain simulation platform, **DEMS**, M18

D.2.2.1-Port logistics operation tool (DSS), **UNIGE**, M44

D.2.2.2 -Green Smart logistics port demonstration cases assessment and evaluation, **UNIGE**, M24, M54

D2.3.1i- Seamless logistics operations demonstrations cases assessment and evaluation, **UNIGE**, M24, M54

D2.3.2 -Port traffic flows tool (DSS), **DEMS**, M44

D2.4.1 -Multimodal access tools (for 2 solutions), **FCT**, M18

D.2.4.2 -Mobility Plan for ports, **FCT**, M42

D2.5.1 -Real time waterborne traffic optimization tool web, **ONAIR**, M36

D.2.5.2 - Software, Ship navigation & emission simulator, **WRTL**, M40

D.2.5.3 -Energy management optimizations; **DEMS**, M36

D.2.6.1i -Environmental Monitoring Services, **CyI**, M30, M54

D2.7i -ICT architecture, **CG/UNIGE**, M18, M54

WP3 – Greening Port Services Demonstration

WP #	3							Start month 9								End month 54			
WP title	Greening Ports Services Demonstration										Lead Beneficiary: AT								
Participant #	#2	#3	#4	#5	#6	#7	#8	#10	#16	#18	#19	#21	#22	#23	#24	#25	#26		

Short name	PGA	KSSA	PAS	CTL	CYI	UNIGE	KU	CNRS	GSH	AT	FCT	CTI	SINAY	SIARQ	BSC	FBT	WRSL	
Person-months	282	81	120	56	18	10	30	17	16.5	167	4	52	15	15	15	24	20	

Objectives WP3 will consider solutions previously developed as building blocks and will adapt them to fit with the functional needs and strains of the lighthouse and fellow ports. Consequently, WP3 will focus on the best mix of solutions, on their interfaces, and on the planning for pilot demonstrations for each port. For that purpose, a comprehensive suite of complementary technological solutions developed by the consortium in WP2 will be tested in real-world conditions (lighthouse and fellow ports) to further assess the performance of the low-emission mitigation measures implemented by the ports and their positive environmental impact. Field performance monitoring mostly concerns GHG emissions and Air Quality within ports at the beginning and at the end of the project in order to provide an independent quantification of GHG and Air Pollutant emission reduction.

Task 3.1 – Port services adaptation – Period: M9-M36 – Leader: ALTRAN; contributors: UNIGE, SINAY, SIARQ, CNRS, CyL, KLAIPEDA University, BSC

GREENING PORTS will test the overall system developed in WP2 according its 3 layers:

3.1.1 ICT Architecture

We will connect with satellite imaging WEkEO cloud platform and its Application Programming Interface local Solar Hub network equipped with environmental, noise and traffic sensors. We will develop data cubes connected with the ICT system (see Task 3.2).

3.1.2 Energy simulator

We will tune model settings for SmartNautilus with specific data from the ports (CO2 emissions and energy consumers). We will study, purchase and manage the implementation of connectors. Consequently, we will fine-tune the DSS and will produce a mapping of energy sources and sinks within the port environment.

3.1.3 Services & applications

To adapt and test services and applications dedicated

Energy - We will set up Low Carbon Energy solutions previously developed or selected in WP2: adapting Energy Smart Grid solutions to their future environment. We will provide Engineering studies concerning tie-ins and interfaces with Port infrastructures. The, we will deliver project management for purchasing, follow-up for procurement, works, and commissioning of the solutions. We also will run Energy Simulations on every port case as described into tasks 3.3 to 3.6.

Mobility and Logistics: - We will assess and set up Green Smart Logistics processes and Seamless Logistic Operations models for real world port activities. We will operate their tests and functional validations bound to TRL7 step and send them to WP4 monitoring and exploitation phase. - We will apply the same adaptation and TRL7 demonstration process to Multimodal Access (On-Demand Transport & Smart Park Zones).

Environment - Solar Hubs will allow deploying Environmental Services, as they will be equipped with GHG and PM10 sensors.

GREENING PORTS will gather lessons learnt during studies and project phases on issues and standards applied on port environment and will create guidelines, rules and standards for port solutions adaptations.

Task 3.2 – Digital activities – Period: M9-M54 - Leader: CREOTECH, contributors, GSH, FACTUAL

The task covers delivery and integration activities of the project outcomes in their digital dimension.

3.2.1 Develop GREENING PORTS Data Cubes:

- Definition of the data sources, architecture of Port Digital Platforms, Port Data Management Plan
- Prototype demonstrating data cubes structure, collection handling and functional organization of all data and data ingestion methods.
- Adaptation for final solution: implementation efficiency/optimization mechanisms for each port.

3.2.2 GREENING PORTS Digital Platforms, integration of digital outcomes

- We will design Port Digital Platforms in parallel and in close relation with Data Cubes.
- Prototype will allow to demonstrate and validate (in link to Data Cubes prototype delivery) the platforms structure, features and functionalities both in technical and user dimensions
- Final solution of the platform: using full Data Cubes functionality and providing required digital outputs towards the identified stakeholders, accessible through dashboard developed under WP4

Task 3.3 – Lighthouse deployment – Period: M9-M54 - Leader: GDYNIA update in progress by GDYNIA –CG
Participants: CyI, GSMA, BSC, UNIGE, SIARQ, FBT

3.3.1 Energy Services (Period M9-M54) (GDYNIA, ALTRAN)

- PV Cells and/or wind turbines: practical use in the newly designed infrastructural investment: “Construction of the Outer Port in the Port of Gdynia” and other places in Port of Gdynia.
- H2 Production and storage,
- Heat Pumps and Dimmers for buildings,

Every test will be performed on those systems to validate they are working on their nominal mode.

Energy Simulations of solar & wind production with storage/charge facility, connection between existing grid and the new grid for energy management platform integrated in the dashboard (WP4)

SIARQ Solar Hub deployment will be done through a Pilot of 10 units covering 2,5km2 including sensors for CO, CO2, NO2, SO2, PM10, PM2.5, O3, Noise and traffic and mobility flows. Also, the infrastructure deployed will be generating solar light depending on the Gdynia port needs. Its components are Plug & Play.

3.3.2 Mobility and Logistics Services (Period: M9-M54) (GDYNIA, ALTRAN, FACTUAL)

- Construction of a charging station (e.g. for scooters) to limit car traffic inside the port and in the immediate vicinity of the port.
- On-demand mobility service - we will develop an on-demand bus service connecting port premises to GDYNIA main street and a transport hub using its linked third-party NE-MI mobile application

3.3.3 Environmental Services (M9-M48) (GDYNIA, CyI, CNRS, SIARQ, FBT, BSC)

monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Gdynia port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and offshore and onshore UAV-based samplings. These campaigns will allow concentration mappings for air pollution, GHG, and PM10. We will measure and map noise propagation thanks to SOLAR HUB network implementation (see above). If studies show interest for further precision, GDYNIA Port proposes to install additional sensors (~20), design new feature noise calculator, and issue noise propagation maps, updated every 10-30 minutes. The definition of level of noise models will allow application of legal standards to terminal operations and to construction works. We will study and develop solutions for waste and ballast water cleaning systems, install demonstrators and manage projects to adapt following technologies for GDYNIA Port. The results of the tests during the demonstration period will be used to make a proposal for full scale waste and ballast water cleaning systems including a cost / benefit analysis.

Task 3.4 – KLAIPEDA Demonstrations – Period: M9-M54 - Leader: KLAIPEDA, contributors KLAIPEDA university, SINAI, BSC

3.4.1 Energy services. Period: M12-24. (KSSA, KU, ALTRAN)

We will provide feasibility studies for work fleet retrofit and for new green fuelled workboats. We will carry out design studies, specifications for purchases in the future and coordination of works and commissioning for the interfaces between port utilities and the small-scale green hydrogen vessels or generation station to demonstrate its technical and financial feasibility. Relevant air measurements will be carried out by Klaipeda University for assessments of GHG reduction effect of electrification of port activities such as stevedoring. KLAIPEDA recently bought 5 electric locomotives and intends to schedule further electrification depending on the demonstration of its efficiency and technical and financial feasibility.

3.4.2 Logistics Services. Period: M30-45. (KSSA, AT, UNIGE)

Impact assessment on logistic systems of integrated low-emission energy supply by purchasing an electric hybrid-driven workboat. Due to the frequent (non-stop) use of the workboat, this port case will focus on the technical, financial and operational feasibility, on the reduction of GHG emissions and on supply chain impacts. We will simulate the hydrogen and/or hybrid driven workboat navigation in the port area, interaction with the port traffic, optimization of the boat energy consumption, simulation of the refuelling manoeuvre and selection of the proper position of the refuelling station, simulation of the communication flows to/from dashboard (WP4).

3.4.3 Environmental Services (M9-M48) (KU, BSC)

Monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Klaipeda port case. They will be based on fixed recurrent samplings and precise intensive samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM10.

Solar Hub deployment will be done through a Pilot of 10 units covering 2,5km2 including sensors for CO, CO2, NO2, SO2, PM10, PM2.5, O3, noise, traffic and mobility flows. PV cells will energise the network to deliver electricity and to route data up to Urban Brain digital platform through the Cloud.

Task 3.5 – PAS Demonstrations – Period: M9-M54 - Leader: PAS, CyI, CNRS, SINAY, BSC**3.5.1 Energy Services PAS M12-24.**

Energy simulation of hydrogen workboat navigation in the port area, interaction with the port traffic, optimization of boat energy consumption, simulation of the refuelling manoeuvre and selection of the proper position, of the refuelling station, simulation of the communication flows to/from dashboard (WP4)

3.5.2 Mobility Services: (PAS)

Green logistics, employee mobility, optimization of trucks traffic

Green hydrogen production and supply station (s): PAS will carry out the implementation of Hydrogen production/supply station(s). The station(s) will serve for all future hydrogen driven vehicle

3.5.3 Environmental Services (M9-M48) (PAS, CyI, CNRS, SINAY, BSC)

Monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Gdynia port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and UAV-based samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM10.

Task 3.6 – CTL Demonstrations – Period: M9-M54 - Leader: CTL, contributors WSTL, CyI, CNRS, BSC**3.6.1 Logistics Services: (CTL, WST)**

Green logistics demonstration on shipping side and on port operation side. The service is based on integrated simulator environment to evaluate efficient way of execution ship voyage, port approach and port resources utilization, with minimized fuel consumption, reducing anchorage waiting time, optimizes approach manoeuvres.

3.6.2 Environmental Services (M9-M48) (CTL CyI, CNRS, BSC)

Monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Limassol port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and UAV-based samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM10.

Deliverables

D3.1 Adaptation Management Plan (AT including contribution of GSH), M10

D3.2 Final Handover Dossiers for every port. AT, M42

D3.3 TRL7 Green Port System validation plan. AT M40

D3.4 Green Port Validation Report: AT, M18-M45

D3.5 Concentration Mapping for Air Pollutants, GHG and PM10 before (T0) and after (Tf) implementation of port cases, Cy.I., M18-M24 for T0 and M42-M48 for Tf

D3.6 Scale up road map for all demonstrators, including cost/benefit analysis, AT, M50

WP4 – Greening Ports assessment and enhancement

WP #	4						Start month 6										End month 54					
WP title	Greening Ports Services Demonstration										Lead Beneficiary: TAS											
Participant #	#1	#6	#7	#8	#9	#10	#12	#15	#17	#18	#19	#20	#21	#22	#23	#24	#25					
Short name	CG	CYI	UNIGE	KU	CERTH	CNRS	TAS	DNVGL	DEMS	AT	FCT	ONAIR	CTI	SINAY	SIARQ	BSC	FBT					
Person-months	21	8	7.5	8	49	17	117	3.5	18	25	8	16	4.5	20	7	9	3.5					

Objectives To quantify the impact of the **GREENING PORTS** transformation. With the assessment of the impact, this work package also provides keys for decision support to help port authorities. These objectives are made possible by measuring the KPIs of the services implemented in ports, implementing monitoring solutions, investigating actions to help decision-making for enhancement. All these monitoring solutions and KPIs are reachable and summarized on a dashboard, developed in this work package, to ensure a user-friendly access to the impact supervision system. In line with ECOPORT guidelines the impact assessment is centred around three pillars, which are considered in this WP:

- Environmental impact assessment and enhancement

- Mobility flows impact assessment and enhancement
- Energy efficiency impact assessment and enhancement

Task 4.1 - Design the KPIs and define the infrastructure architecture and interfaces with services; Period: M6-M24; Leader: CG; Contributors: TAS, CERTH, SINAY, CG DEMS, ONAIR, CG DEMS, CREOTECH

The purpose of this task is to define the needs and the concept of operations for the [GREENING PORTS](#) supervision system. Regarding the implemented and deployed services in ports (in WP2 and WP3), relevant KPIs are defined. In this task, developments are planned in versions, to be consistent with the planning of the services implementation in the WP2 and WP3 and to meet ports authorities' priorities. The purpose of this task is also to design the architecture of the supervision system to ensure a unique access for ports authorities. In this task, the system interfaces and the external data streams are also defined, for example space earth observation data. The purpose of this task is also to set up the cloud infrastructure and to develop the different components and the connection tools for data streams collection.

Task 4.2 - Environmental Life Cycle Assessment; Period: M6-M54; Leader: ALTRAN; Contributors: CG, CERTH, SINAY, CG DEMS

The purpose of this task is to assess and enhance environmental port impacts to meet ECORPORT criteria for PERS, ISO 14001 and EMAS certification,. Three environmental analysis are performed over project duration to evaluate the benefits of key decisions/actions implemented from the decarbonation strategy identified in WP1. To this aim, the Life Cycle Assessment (LCA) methodology is used as defined by the ISO 14001-14040-14044. First of all, the limit of the system studied is set according to the adaptative generic port modelling and data collected in WP1 (raw material, energy, mobility, logistics, industry, waste, end of life management, etc.). The collected inputs and outputs flows are implemented automatically into software to be converted into environmental impacts.

Task 4.3 - Environmental impact assessment and enhancement of greening ports transformation; Period: M12-M54; Leader: CERTH; Contributors: CG, TAS, CyI, SIARQ, BSC, FBT, SINAY, UNIGE, CNRS, KU

The purpose of this task mainly is to further exploit the environmental monitoring and KPIs measuring solution designed in WP2 and implemented in the different ports in WP3. An emphasis will be given to GHG and Air Pollutant Monitoring in order to assess the positive environmental impacts of low-carbon emission measures in the lighthouse/fellow ports. This task also focuses on translating the KPIs levels into decision-making to improve the [GREENING PORTS](#) transformation in collaboration with other WP. The environmental supervision solution gathers the following functionalities:

- Air Quality monitoring in lighthouse and fellow ports
- GHG and Air Pollutant emission monitoring in lighthouse and fellow ports
- Noise monitoring in GDYNIA port
- Water pollution monitoring in GDYNIA port
- Planning monitoring in lighthouse and fellow ports

Task 4.4 - Mobility flow impact assessment and enhancement of greening ports transformation; Period: M12-M54; Leader: SINAY; Contributors: TAS, ONAIR, FACTUAL, UNIGE

The purpose of this task mainly is to further exploit the mobility flow monitoring and KPIs measuring solution designed in WP2 and implemented in the different ports in WP3. This task also translates the KPIs levels into decision-making to improve the [GREENING PORTS](#) transformation. The mobility flow supervision solution gathers the following functionalities:

- Multimodal and efficient access monitoring in GDYNIA port
- H2 and/or Electric small vehicles use monitoring in GDYNIA port
- Logistics services monitoring in KLAIPEDA port
- Employee and truck mobility service monitoring in PAS port
- Green smart logistics assessment in GDYNIA port
- Seamless logistic operations assessment in GDYNIA port
- Traffic demand forecasting in lighthouse and fellow ports
- Transparent multimodal positioning and communication service assessment

Task 4.5 - Energy efficiency impact assessment and enhancement of greening ports transformation, Period: M12-M54, Leader: DEMS; Contributors: TAS, SIARQ, DNVGL, UNIGE, ALTRAN, KU

The purpose of this task mainly is to further exploit the energy efficiency monitoring and KPIs measuring solution designed in WP2 and implemented in the different ports in WP3. This task also focuses on translating the KPIs levels into decision-making to improve the [GREENING PORTS](#) transformation in collaboration with other WP. The energy efficiency supervision solution gathers the following functionalities:

- Low carbon energy supply and demand impact assessment in GDYNIA port

- Energy simulations and optimisations evaluation in lighthouse and fellow ports
- Energy services assessment in KLAIPEDIA port
- Energy services assessment in PAS port
- Solar Hub deployment monitoring in GDYNIA and KLAIPEDIA ports

Task 4.6 - Dashboard design summarizing the KPIs portfolio to help the port authorities in decision-making; Period: M12-M54; Leader: TAS; Contributors: TAS, ONAIR, CERTH, CG, KSSA, GPA, PAS

The purpose of this task is to implement, maintain and enhance the KPIs dashboard including also advanced statistical analysis results and reports. This dashboard summarizes all the KPIs monitored in the project and ensures a user-friendly access to the impact supervision system. This task also includes the validation of the indicator's relevance with green ports authorities and the collection of feedback for KPIs enhancement. Data analysis sub-tasks that will be supported by the dashboard will include:

- Green Port Performance Index by combining all available KPIs and other green port factors, using machine-learning algorithms.
- Explainable AI for big data analysis to provide valuable insights (economic, environmental, social, etc.) to optimize the decision-making process.
- Statistical analysis on time series to provide trend and seasonality estimation.

Deliverables (brief description; **leader**, and month of delivery)

D4.1 User needs and validation plan for the supervision system, **CG**, M12

D4.2 Architecture and interfaces of the supervision system, **TAS**, M18

D4.3 Dashboard user manual, KPIs definition and keys for decision-making, **TAS**, M24, M36 and M48

D4.4 Impact assessment report: LCA and services impact assessment, **AT**, M30, M42 and M54

D4.5 Ports authorities satisfaction report and services feedback, **CG**, M30, M42 and M54

WP5 – Cooperation, Replicability and Exploitation

WP #	5						Start month 1								End month 54							
WP title	Greening Ports Services Demonstration										Lead Beneficiary: GSH											
Participant #	#1	#6	#7	#9	#12	#13	#14	#15	#16	#19												
Short name	CG	CYI	UNIGE	CERTH	TAS	3OC	INVENT	DNVGL	GSH	FCT												
Person-months	10	4	17	14	2	6	6	2	35	4												

Objectives The main objective of WP5 is to develop a solid evidence base demonstrating that **GREENING PORTS** are superior to current state & form steps and actions to activate a successful replicability and market expansion. WP5 incorporates field port performance monitoring with a view to assessing the effectiveness of the deployable - scalable solutions and replicating them to new “customer ports”. The excellence will be determined by measuring the performance difference (for comparable activity levels) between the initial status, use the acquired port field data (environmental & transport) assessment system & ICT project tools to evaluate and demonstrate the positive impacts of **GREENING PORTS** and their interactions with existing port infrastructure in the demonstration ports (pilot and followers) at a variety of scales & conditions, set within a context to allow for cross-comparisons and cross-fertilization of lessons between ports causing replicability/scalability and also opening new markets. Business plan and establishment of a spin off schema as a commercial umbrella is considered.

Description of work

Task 5.1 - Inventory of activities – Period: M1-M54 - Leader: GSH, Contribution: CERTH, INVENT, FACTUAL, UNIGE: Based on seamless monitoring of the **GREENING PORTS** technical solution (WP2, WP3, WP4) and a detailed study of its outputs and impact assessment (WP4), an itemized list of assets for Replicability and Reproducibility will be produced. Also:

- further customize by integrating demand & forecasting into inventory management, scalable - allow the prediction of the "can fit" point -mature per-product approach

- products & interoperability of services, tools & decision support systems, promote optimal product-mix solutions on overall profits -product-cost
- integrating demand forecasting covering wide variety of ports worldwide
- development & promotion of new multi-actor governance arrangements that will address the interactions between all port-related stakeholders, models for policy response.

Task 5.2 – Expert Team Group Capacity Building - Period: M6-M54 - Leader: CG, Contribution: TAS, INVENT, GNV GL, GSH, CERTH-HIT: This task effort covers:

- best practises: quantified enhancement of synergies/cooperation/collaboration with experts on maritime/transport/energy/environmental/ICT & commercial market - earmark appropriate resources for coordination, communication efforts & relevant research work with other projects and initiatives(session 4-5 Annex Support & Advisory Board Letters). Learning from the best: this task will review the partner ports that best perform in terms of digitalisation, logistics, data management, sustainability, etc. (agreements with the ports will be sought through the partners' network during the project) and will organise learning expeditions with pilot ports' employees.
- clustering activities with relevant projects- cross-projects co-operation, consultations & joint activities on cross-cutting issues, share of results, participating in joint meetings & communication events, improving liveability & democratic co-governance lobbying with elected officials. Close collaboration with the European Commission, Directorate-General for Maritime Affairs & Fisheries, Sea bassin strategies, Maritime Regional Cooperation & Maritime Security etc.) & lawmakers, meetings with EU policy makers - vocal lobbying efforts - challenge a range of systemic & cultural norms, existing initiatives (ESPO, MedPort, HELCOM, ECG to name a few).
- Living Lab operations as well as a digital competence center: apply the Open Innovation Community Copernicus Masterprocess

Task 5.3- The GREENING PORTS Replicability/scalability - Period: M6-M54 - Leader: UNIGE, Contribution: CG, CERTH, GSH:

- scalable solutions to be replicated/gradually scaled-up to larger or scaled-down to smaller ports, together with the demonstration of their environmental sustainability & technical, operational viability via mentoring & coaching with the help of the Expert Team Group (T5.2).
- put together all available information research and results → gather all the pieces of the picture -regularly screen project results → get in touch with interested expert users (D5.2.1) →proceed to expert market research, show the products list & interoperability of services, design a Roadmap, expand the working group
- replicability/scalability models: No of new marketable replicable products and/or new business initiatives, such as list of shipping companies, touristic operators/cruises, port social entrepreneurship, start-ups (>5 new products and >10 new businesses); No of businesses that master and adopt new **GREENING PORTS** paradigm and tools (>5 new trained)
- interactions within WP7

Task 5.4- The GREENING PORTS MASTER Plan - Period: M6-M54 - Leader: INVENT, Contribution: CG, Cyprus Institute, UNIGE, FACTUAL, 3OCLOCK, GSH

The plan for the future Green Port, with the vision and a roadmap with milestones to achieve GHG neutral shipping & minimal pollution in maritime and inland port areas

- clarify how **GREENING PORTS** existing & new products-solutions integrated within the project multi-lab collaborations, will increase the quality of services and information provided, allowing a more in-depth analysis and definition of roadmaps,
- facilitate the acceptance & utilization by the market of all or selected project results showing that their performance is proved and exceeds the expectations,
- investigate the standardization potential of selected results (cross-cut collaboration with WP6),
- openness, transparency & independence of the **GREENING PORTS** products-solutions,
- use the standardization as a tool for dissemination & interaction with the market experts & stakeholders,
- port reform e.g. re-adjust the port taxation system to provide green incentives; provide a legal framework via WP6,
- long-term deployed approaches, allow the port user to interact with port authorities & citizens, experience the proposed solutions at planning stage and select their preferred option ... involve social sciences & humanities disciplines: psychology, behavioural science, economics, law, sociology, or? (cross-cut collaboration with WP7) with particular attention devoted to gender dynamics and diversity, resulting: port culture change with adopting policies, building the framework to decarbonize ports along with all the services, interactions with WP7 - opinion pieces, blogs, social media, and comment sections...

Task 5.5 – The GREENING PORTS Exploitation and post-project sustainability– Period: M1-M54 - Leader: GSH, Contribution: CERTH, CG, 3OCLOCK, UNIGE

The vision is to follow the Smart Goals³⁴, to make the **GREENING PORTS** Exploitation goals clear and reachable. Identify sound business models, replicable to other port markets, develop new resources, activate techniques, get input from T.5.1-T.5.4 & incorporate. List of activities to be performed:

- IPR Review, interactions with WP6
- Feasibility Study Guidelines: first step proves the actual potential & commercialization mechanism, description of the outcomes to be commercialized, market identification & analysis, exit strategies as well as personnel & organizational requirements.
- Business Modelling: Business Model Canvas-BMC approach, positioning in the market, business cycle, Technology Readiness Level (TRL), Market analysis, knowing other innovators, competitors, Potential strategic collaboration partnership.
- Business Plan: project outcomes to be brought to market including steps towards and after the project end, funding opportunities including private funds, funding through other national and/or regional R&I programmes, etc. Maximize the impact of the project outcomes: **1)** increase of the market-readiness **2)** identify mechanisms to lower the market entry barriers of the developed **GREENING PORTS'** outputs **3)** positioning the project outputs **4)** investigate the pricing policy, promotion strategy, sales channel creation, operational plan and business strategy **5)** establishing a spin off **schema** (legally established) that will work as a commercial umbrella and the **GREENING PORTS** partners act as distributors. This schema will be flexible and increase competitiveness and job creation. Critical success factors (CSFs): develop a conceptual model to encapsulate through innovation diffusion, financial projections, including cash-flow analysis to estimate post-project funding needs and investor targeting based on projected IRR and venture risk at commercialization time, addressing the associated investment/cost implications (incl. operational and capital expenditures) shall be investigated in the flexible spin off schema **6)** post-project sustainability and the continuation of the community **GREENING PORTS'**.

Deliverables (brief description; **leader**, and month of delivery)

D5.1 Inventory of activities: Reports. GSH, M6

D5.2i Clustering /Capacity building guidelines, GSH, M12, M48, M54

D5.3 Master Plan, INVENT, M54

D5.4 Business Plan and post-project sustainability: M36 (GSH business modelling), M54 (UNIGE)

WP6 – Greening Ports frameworks

WP #	6					Start month 1										End month 54				
WP title	Greening Ports Services Demonstration										Lead Beneficiary: HGG									
Participant #	#7	#11	#15	#16	#21															
Short name	UNIGE	HGG	DNVGL	GSH	CTI															
Person-months	33	46	16	5	3															

Objectives

This work package aims at assessing the non-technological framework conditions, namely the legal framework (WP6.1), the economic framework (WP6.2) and the standardization framework (WP6.3).

Task 6.1 - Legal Framework – Period: M1-M54 - Leader: HGG

The task will focus on the analysis of the existing legal framework that is relevant, from a public international law and a European Union law perspective, to the transition to a greener mode of shipping with particular regard to the ship/port interaction. It will also assess the legal framework conditions, such as potential regulatory actions in the short and medium term, which can provide legal certainty for implementing low-emission solutions:

Sub-task 6.1.1: Assess the legal aspects of green ports in the law of the sea, maritime law and environmental law [D.6.1.1.1], inter alia:

³⁴ <https://www.mindtools.com/pages/article/smart-goals.htm>

- Assess the evolution, current status and future perspectives of the international legal framework governing GHG emissions from ships;
- Assess and monitor the work which is going within the International Maritime Organization, both with regard to its content as well to its form and scope of application;
- Assess the European Climate Law and its application to shipping, with particular regard to the measures to be adopted within the proposed “European Green Deal”;
- Assess the role of the EU as a standard-setter against the backdrop of the doctrinal debate of multilateralism v. unilateralism in environmental protection from shipping;
- Assess the impact on ports of the above-mentioned existing and potential normative developments from the point of view not only of the raising of environmental and efficiency standards, but also of competition within ports and between ports in the context of the emerging European port policy.

Sub-task 6.1.2: Assess the evolution, current status and future perspectives of the EU law framework for green ports regarding:

- Data protection law subject to the General Data Protection Regulation (GDPR) and ancillary provisions, applied to the services and technologies to be developed in the project [D.6.1.2.1];
- IT and telecommunication law applied to the issues raised in the project [D.6.1.2.2];
- IP law, including licensing applied to the issues raised in the project [D.6.1.2.3];
- Liabilities and responsibilities which might occur in the context of the project [D.6.1.2.4].

Sub-task 6.1.3: Assess the legal aspects of green ports in aviation and space law, particularly regarding the use of unmanned aerial vehicles (UAV) in ports [D.6.1.3.1]. The activity will focus on all legal/formal/organisational activities needed to make drones use in port formally possible, esp. in BVLOS (Beyond Visual Line of Sight) mode, preferably also for fully automated flights.

- Alignment to currently changing related regulations and European common U-Space environment
- Ensuring formal possibility to fully operate drones in the selected ports (pre-flight preparations and analysis, operators/pilots licensing, flight permissions)
- Establishing (as the most probable scenario) the so called DTM (Drone Traffic Management) zones in which the ports will have sole responsibility to control the UAV traffic
- Compliance with all specific requirements outside the aviation law (e.g. related to noise emission).

Sub-task 6.1.4: Assess the ethical aspects of the personal data protection of the project.

- Applying the General Data Protection Regulation (GDPR) and ancillary provisions for data processing in the project itself [D6.1.4.1 + D6.1.4.2].

Task 6.2 - Economic Framework – Period: M1-M54 - Leader: UNIGE

The task will focus on understanding economic elements that might be used to boost the green port transition, incentivizing the implementation of new technologies and practices having positive – or at least neutral – impact on the business performance of key port and transport operators. As such, the task will:

- **Assess costs and benefits of different green port proposed solutions**, linking these to differentiated financial aspects (e.g. source of funding, ROI). This part of the analysis will be based on KPIs provided by WP1 (Task 1.3) and WP2 (i.e., port service characteristics). The aim will be the definition of a matrix to be used for the evaluation of relevant alternative solutions and business-related impacts. Such matrix will be included in the Master Plan (WP5) as a way for monitoring financial and environmental performance of the application of greening port outputs. Such **matrix will represent the first deliverable [D.6.2.1] of economic framework**;
- **Assess the market mechanisms and possible incentives capable of promoting a smooth transition** between carbon-based activities towards a fully decarbonized port activity. Within this part of the analysis, alternative market mechanisms (e.g. concession fee, taxation, subsidies, etc.) will be assessed also in connection with alternative financial supporting tools (WP1 [task 1.3] and D.6.2.1) and business models (e.g. public-private partnerships, joint-venture). Such assessment will be an integral part of both the Master Plan and the non-technological framework. In order to develop the market incentive mechanisms, primary data collections will be needed (e.g. surveys, interviews, identification of best and alternative practices, experiments for testing effectiveness of proposed measures, etc.). As such, specific outcomes considering the local peculiarities of the **GREENING PORTS**’ partners will be reported, together with the generalisation of such exercise. For achieving this last outcome, the survey will be delivered at a sample of ports representing all EU countries. **The outcome (D.6.2.2) will be an assessment of market mechanisms capable of promoting different green port services and technologies.**
- **Assess the wider economic impacts through the evaluation from a social and economic perspective of the effects of certain actions on the wider community and region** (e.g. modification of prices of imported goods, impact of increased/decreased accessibility on local economy, productivity changes, employment, wages,

interoperability issues, sunk costs, path dependency, etc.). These impacts will consider the need for industry modifications caused by the greening of port services (e.g. impact of decarbonisation on logistics performance and related regional costs). Some of the inputs needed for such analysis are determined within other WPs (e.g., WP2 for the logistics operations, multimodal access, etc.) while social and economic effects will be based on desktop assessments and interviews on a sample of EU port regions. Moreover, in order to finalise such analysis, a critical discussion and assessment of the impact of governance and multi-actor collaboration models on the wider economic impacts will be included. **The outcome constitutes D.6.2.3 and it will represent a discussion of wider economic effects of greening port activities on port regions and related hinterlands.**

Task 6.3 - Standardization Framework – Period: M1-M54 - Leader: DNV GL

The task will focus on the analysis of the existing technical standards framework that is relevant to the transition to a greener mode of shipping, with particular focus on the ship/port interaction [D.6.3.1].

Subtask 6.3.1: alignment on the technical scope of work

- Alignment and coordination with contributors to the other WPs and with external stakeholders for the project (port authorities, port terminals etc.).
- Definition of a commonly agreed basis of scope and areas of interest upon which to refine the technical standard framework analysis.

Subtask 6.3.2: standard framework definition

Development of a list of applicable technical standards to constitute a standardization framework for the activities proposed and implemented during the project:

- Class rules and guidelines for implementing green solutions onboard ships (e.g. fully electric ships, fuel cells, LNG / Hydrogen storage onboard)
- International standards and guidelines for the development of port facilities
- International standards and guidelines to enhance the energy efficiency of ships

Standards under development at EU / International level will also be included in the analysis.

Subtask 6.3.3: applicability checks

The technical standard framework identified in the previous activity will be compared with the project technical scope in order to identify potential gaps and areas which are not fully covered by the existing standards framework.

Deliverables (brief description; **leader**, and month of delivery)

D6.1.1 - Publication on the legal aspects of GREENING PORTS, **HGG**, M52

D6.1.2 - Videos on the legal aspects of GREENING PORTS, **HGG**, M52

D6.1.3 – **Legal framework** incl. law of the sea, maritime law and environmental law, data protection law, IT and telecommunication law, IP law, on air and space law, incl. licensing, Liabilities and responsibilities **HGG**, M52

D6.1.4. - Data Management Plan, including Ethics self-assessment of the project, **HGG**, M6 and updates M12, M36

D6.2.1 – **Economic framework**: Economic Dashboard and Market Mechanism, **UNIGE**, M48, update incl. Wider Economic impacts, **UNIGE**, M52

D6.3.1 – **Standardization framework** incl. standardization impacts, **DNV GL**, M52

WP7 – Engaging communities and boosting Greening Ports

WP #	7						Start month 1								End month 54							
WP title	Engaging communities and boosting GP										Lead Beneficiary: 3OC											
Participant #	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20		
Short name	CG	PGA	KSSA	PAS	CTL	CYI	UNIGE	KU	CERTH	CNRS	HGG	TAS	3OC	INVENT	DNVGL	GSH	DEMS	AT	FCT	ONAIR		
Person-months	5	10	10	8	4	1.5	1.5	1.5	1.5	1.5	3	1.5	42	1.5	1.5	1.5	1.5	1.5	11	1.5		
Participant #	#21	#22	#23	#24	#25	#26																

Short name	CTI	SINAY	SIARQ	BSC	FBT	WRSL													
Person-months	1.5	1.5	1.5	1.5	1.5	1.5													

Objectives

This work package aims at raising awareness, engaging communities and citizens, disseminating results, and building knowledge to boost the uptake of the solutions implemented in the project. These objectives are fundamental and strategic elements for the success of **GREENING PORTS**. The specific objectives of this work-package are:

- To implement an action plan for effective communication aimed at promoting the work carried out in **GREENING PORTS**, and informing and engaging the project's target audiences
- To disseminate the knowledge and results generated in **GREENING PORTS** to the project's stakeholders
- To identify and collaborate with other projects (clustering), associations and organizations, with the aim to share resources, achieve synergies and exchange information and knowledge
- To promote widely the Master Plan developed by **GREENING PORTS** to all actors who may be concerned in decision-making and analysis processes for ports
- To design and implement a participatory process where local citizens and actors are engaged in the design phase of the solutions and concepts implemented in the project's ports with a view to address their needs and pain points linked to the ports' activities
- To bring together a variety of actors to work on challenges that citizens face and boost the uptake of green ports.

Task 7.1 – Citizen observatory – Period: M1-M54 - Leader: 3OC Contributors: ports, all partners

Subtask 7.1.1 Citizen research Period M1-M24

The objective of this task is to understand the main pain points and problems of citizens living close to the ports in the project. The output will be a prioritised map of existing problems linked to the ports' activity. It will be undertaken by 3OC and the 4 ports in the proposal. The activities planned for each port includes:

- Community maps of the ports (employees, visitors, infrastructure users, etc.) with their interests and relation to the ports.
- Mapping of existing citizen engagement initiatives carried out by the city or the port
- Engagement activities: +30/50 interviews + 1 survey + world cafés or similar in-person events (or other innovative activities to collect feedback from citizens)
- Setting up of an online tool accessible through the ports' and the project's website for citizens to post their issues and solution proposals
- Analysis of the information to produce a problem map per community

The problems stemming from these activities will be divided into two categories: 1) the scope is addressed in the project: problems will be treated in task 7.1.2, in which workshops will be organized to co-create the **GREENING PORTS** services with citizens, integrating their views and giving them the opportunity to participate in the design of services; 2) the scope is not addressed in the project: these problems will be treated in task 7.2, which is dedicated to the organization of a Portathon (open challenge).

Subtask 7.1.2 Co-design of solutions in the project and citizens' loop to integrate feedback – Period: M12-M54

This task will use the problem maps designed in Task 7.1.1, for which the scope is addressed in the project. The objective is to co-design solutions locally by integrating citizens' inputs in the service design activities carried out in WP1 and WP2.

Two workshops will be organised in each port with different citizen segments to propose services and value propositions that can address the identified pain points. Online feedback gathered in 7.1.1 will feed into the preparation of the workshops. Participants will include service providers in the **GREENING PORTS** proposal, port authorities and citizens. Active discussions will be engaged, taking the most out of the different perspectives, and maximizing collaborative thinking and creativity. The problems and the co-designed solutions will be shared with the Task Force in WP1, and their feasibility and integration into the different work packages will be discussed. Solutions will be tested in the ports and feedback from citizens will be gathered through surveys and interviews. It will include questions on the service use, benefits, price and business model. Each service will have various feedback loops to fine-tune them and come up with the most adapted services for the ports. Methodologies and tools will be provided by 3OC to the ports as a capacity building activity, so that the citizen observatories could last after the project.

Task 7.2 – Boosting the uptake of green ports – Period: M42-M54 - Leader: 3OC Contributors: all partners

The objective of this task is to organize an online Portathon and support the winner(s) in taking a new solution to the market & to disseminate widely the final results of the project.

Subtask 7.2.1 Portathon: This event will call for European startups, individuals, companies and/or organisations to submit innovative solutions and concepts to address a set of identified problems (stemming from Task 7.1), which are not addressed within the scope of the project. The following activities are foreseen in this task:

Organisation of the online challenge: definition of the rules, winning criteria, prizes, jury and topics to be addressed by the participants

Promotion of the challenge at EU and local levels: a communication strategy and action plan will be developed specifically for this event to attract as many participants as possible

Implementation of the challenge: development of a landing page, submission page, and rollout of the challenge online. A hotline to support the participants and answer their questions will be available

Definition and implementation of capacity building actions: The winning participants (or teams) will be supported through workshops and coaching sessions to help them take their idea further and closer the market. In particular, the value proposition, business model, and marketing aspects will be defined.

Subtask 7.2.2 Final event: A final event will be organised at the end of the project, back-to-back with the project's final meeting in Strasbourg, to disseminate the results of GREENING PORTS and the Master plan. The event will take the form of a Bootcamp with interactive learning sessions, and experience sharing sessions, with a view to build capacity and give the right tools to the right people to support them in making European ports greener. A special ceremony to award the winning participants with their prize for the Portathon will take place during this final event.

Task 7.3 – Communication strategy and action plan – Period: M1-M54 - Leader: 3OC Contributors: all partners

Subtask 7.3.1 Strategy and tools A detailed Communication and Dissemination Strategy and Action Plan will be developed at the start of the project and will be updated based on the effectiveness of the actions and the evaluation of their impacts. The plan will include a detailed planning of all communication actions, including key messages and defined target audiences, an event and publications management plan, and key performance indicators.

A series of communication tools and actions will be implemented:

- A project brand and visual identity will be designed, including a project flyer and rollout
- Videos and engaging content such as infographics, factsheets, testimonials will be produced to communicate on the project and pilots carried out in the ports
- A website will be designed and updated regularly to serve as the main communication channel to the project's stakeholders and target audiences
- Social media accounts (e.g. LinkedIn, Facebook, Twitter) will be created to promote the material produced within the project, and to build and engage communities and stakeholders
- Legal advice from HGG on use of media, personal data, will be sought when necessary.

Subtask 7.3.2 Awareness raising campaigns

Multilingual targeted communication campaigns to raise the awareness of ports' challenges and ambitions to reduce GHG and pollutants emissions and become more inclusive will be rolled out. Demonstrating the positive impacts of green ports will be at the heart of the campaigns A dedicated website section will be created for these campaigns and the project will build on multipliers and the media to maximize the reach and impact of the campaigns.

Task 7.4 – Dissemination – Period: M1-M54 - Leader: Factual Contributors: all partners

Subtask 7.4.1 Scientific and technical dissemination

This subtask will aim to disseminate the results and progress of the work carried out in [GREENING PORTS](#) to the project's stakeholders, in particular ports, research communities, companies, associations/networks and policymakers. Activities include:

- Identifying **relevant events and coordinating the consortium's participation** in submitting papers, and presenting and disseminating the project's results at conferences, fairs, forums etc.
- **Coordinating publications**, including specialised press, open access journals and online repositories such as Zenodo. Partners' repositories will also be used to archive and make publications accessible
- **Drafting and distributing a yearly electronic newsletter** to inform stakeholders of the project's progress.
- **Distributing deliverables widely** amongst relevant organizations and stakeholders, including by producing user-friendly 'briefing papers' summarizing each key deliverable, with links to full reports on website.

- **Legal advice from HGG** on use of data, results generated in the project and IP rights will be sought when necessary

Subtask 7.4.2 Clustering

A close collaboration will be sought with related H2020 projects in order to carry out joint activities, consultations, share of results. In addition, ties with associations and existing initiatives will also be created to build on their established visibility and maximize the project's reach. Exchanges will be sought with MedPorts association, ESPO, aiVP, ECG (Association of European Vehicle Logistics) to name a few.

Subtask 7.4.3 Master Plan promotion

This subtask will be dedicated to promoting and disseminating the main project's output, the Master Plan, which will provide a roadmap to achieve GHG neutral shipping and minimal pollution in maritime and inland port areas. All of the project's communication and dissemination channels will be used, including the project partners' channels and contacts. A specific LinkedIn campaign will also be rolled out to target the most appropriate audience (project's stakeholders and interested actors). The use of multipliers such as other related projects, associations, networks, organisations to communicate the widely, the press and the media through a press release and mentions, as well as presenting the Plan at relevant national and international conferences will be planned.

Deliverables

D7.1.1 Citizens' problem maps in the four GREENING PORTS M24 3OC

D7.1.2 Co-designed solutions for the project ports report M36 3OC

D7.2.1 Portathon results and report M54 3OC

D7.2.2 Final event proceedings M54 3OC

D7.3.1 Communication and dissemination strategy and action plan M3 FCT

D7.3.2 Mid-term report on communication and dissemination activities M26 FCT

D7.3.3 Final report: communication and dissemination actions M54 FCT

D7.3.4 Awareness raising campaigns report M54 3OC

Table 3.1c: List of Deliverables³⁵

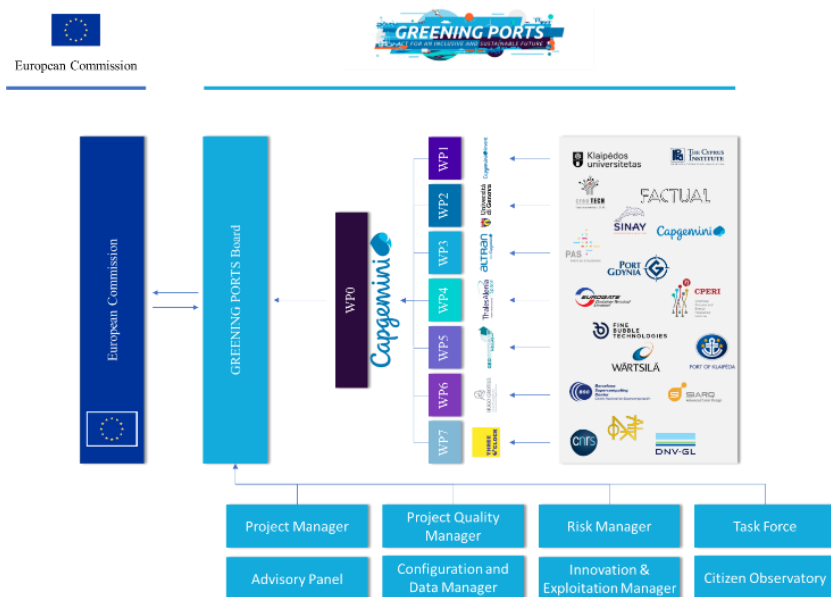
Deliverable		WP	Leader	Type	Diss level	Delivery date (months)
D 0.1	Kick-off meeting report	0	CG	R	PU	M1
D.0.2i	Progress Report	0	CG	R	PU	M6, M12, M18, M24, M30, M36, M42, M48, M54
D0.3	Final report	0	CG	R	PU	M54
D1.1	Ports' Carbon Foot Print Assessment (1 per port)	1	INVENT	R	PU	M4
D1.2	Road map of each services	1	INVENT	R	PU	M12
D1.3	Business case and recommendation for each identified service	1	UNIGE	R	CO	M12
D1.4	Design, Implementation and Monitoring of Circular Economy	1	GSH	R	PU	M6
D1.5	Mapping governance and stakeholders	1	INVENT	R	PU	M12
D2.1i	Low carbon energy production, storage, supply and demand port demonstration cases assessment and evaluation	2	UNIGE	R	PU	M24, M54
D2.1.2	Energy chain simulation platform	2	AT	DEM	CO	M18

³⁵ **Important Note:** The table below shows the deliverables to facilitate the project management and shared with EC. Additional internal deliverables will be produced to reflect the numerous interactions between the involved in each WP. The detailed list is available in Section 4-5 under Annex I.

D.2.2.1	Port logistics operation tool (DSS)	2	UNIGE	DEM	CO	M44
D.2.2.2	Green Smart logistics port demonstration cases assessment and evaluation	2	UNIGE	R	PU	M24, M54
D2.3.1i	Seamless logistics operations demonstrations cases assessment and evaluation	2	UNIGE	R	PU	M24, M54
D2.3.2	Port traffic flows tool (DSS)	2	CG DEMS	DEM	CO	M44
D2.4.1	Multimodal access tools (for 2 solutions)	2	FCT	DEM	CO	M18
D.2.4.2	Mobility Plan for ports	2	FCT	R	PU	M42
D2.5.1	real time waterborne traffic optimization tool web	2	ONAIR	DEM	CO	M36
D.2.5.2	Software, Ship navigation & emission simulator	2	WSTL	DEM		M40
D.2.5.3	Energy management optimizations	2	DEMS	R		M36
D.2.6.1i	Environmental Monitoring Services	2	CyI	R	PU	M30, M54
D2.7i	ICT Architecture	2	CG	R	PU	M18(CG), update M54(UNIGE)
D3.1	Adaptation Management Plan	3	AT	R	PU	M10
D3.2	TRL 7 Green Port System validation plan	3	AT			M40
D.3.3	Scale up road map for all demonstrators, including cost/benefit analysis,	3	AT	R	CO	M54
D4.1	User needs and validation plan for the supervision system	4	CG	R	PU	M12
D4.2	Architecture and interfaces of the supervision system	4	TAS	R	PU	M18
D4.3i	Dashboard user manual, KPIs definition and keys for decision-making	4	TAS	R	PU	M24, M36, M48
D4.4i	4 Impact assessment report: LCA and services impact assessment,	4	AT	R	PU	M30, M42, M54
D4.5i	Ports authority's satisfaction report and services feedback	4	CG	R	PU	M30, M42, M54
D5.1	Inventory of activities	5	GSH	R	PU	M6
D5.2i	Stakeholders, Clustering guidelines and Capacity buildings actions	5	GSH	R	PU	M12, M48, M54
D5.3	Master Plan	5	INVENT	R	PU	M54
D5.4i	Business Plan and post-project sustainability	5	UNIGE	R	PU	M36, M54
D6.1.1	Publication on the legal aspects of greening ports	6	HGG	R	PU	M52
D6.1.2	Video on the legal aspects of greening ports,	6	HGG	DEC	PU	M52
D6.1.3	Legal framework	6	HGG	R	PU	M54
D6.1.4i	Data Management Plan incl. ethical issues	6	HGG	R	PU	M6, M12, M36
D6.2	Economic Framework	6	UNIGE	R	PU	M52

D6.3	Standardization Framework	6	DNV GL	R	PU	M52
D7.1.1	Citizens' problem maps in the four GREENING PORTS	7	3OC	R	PU	M24
D7.1.2	Co-designed solutions for the project ports report	7	3OC	R	PU	M36
D7.2.1	Portathon results and report	7	3OC	R	PU	M54
D7.2.2	Final event proceedings	7	3OC	R	PU	M54
D7.3.1i	Communication and dissemination strategy and action plan	7	FCT	R	PU	M3, M26, M54
D7.4	Awareness raising campaigns report	7	3OC	R	PU	M54

3.2 Management structure, milestones and procedures



Role and responsibilities

Project board. It will supervise the project from a strategic level, will be responsible for ensuring that the necessary resources are made available and will oversee the operation of the project management team. They also provide the top escalation level for the project. Key stakeholders of the project, both internal and external, will have a representative on the project board. At a minimum there will be one representative from each partner and one from the European Commission.

Figure 16 Management Structures

Project decision making and escalation mechanism. All roles within the project will have the authority to make decisions that are appropriate within the project. Where questions or issues arise requiring a higher view of the project then a defined escalation path will be followed.

Project Management team. It will comprise the project manager (who will lead the team) and all the work package leaders. They will be responsible for managing the project on a day-to-day basis and collating together all the information to report on the project status. They also provide the second escalation level for the project.

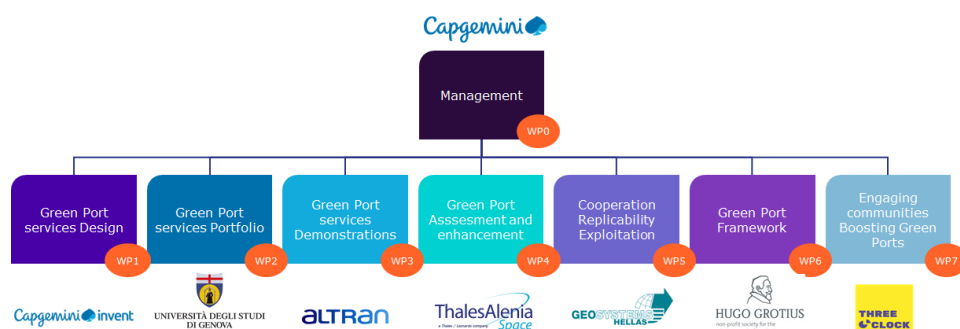


Figure 17 Project Management team

The Project Manager The Project Manager is also assisted by a core team including, Project Assurance Officer (PAO) responsible for ensuring the quality of the delivery, Configuration and Data Manager (CDM), in charge of controlling the configuration within the consortium, and for the deliverables. The project manager of **GREENING PORTS** will be Carine Saüt who will be assisted in her role as project manager by Sebastien Nouvellon for coordination support, and Stéphane Mely for technical management. Duties assigned to **GREENING PORTS** will support the Project manager to coordinate the project activities, in the definition of the project's rules (document and development) and in controlling of all deliverables (even from the other participants) provided to EC.

The project manager from Capgemini will manage internal coordination with support of the Work Package Managers. As coordinator, Capgemini project managers (perform the following tasks:

- Organize coordination meeting with work package manager and any required attendees.
- Regularly inform the other consortium participants of the status of the project.
- Ensure the execution of the tasks is performed according to the defined plan.
- Prepare the progress report that integrates the contributions from other participants with proof reading of Capgemini architect, technical coordinator of **GREENING PORTS** (Mr Stephane Mely)
- Ensure that the data packs are complete and delivered to the EC on time.
- Be the contractual contact for the EC.
- Follow up the actions of the **GREENING PORTS** project
- Coordinating the technical/scientific activities.
- Setting up the common means used by the consortium participants like the project common repository.
- Following up the different development tasks at technical and at scientific levels
- Coordinating Advisory Panel

Work Package Leader As show in the Figure 11, each partner will assign a work package manager for each work package they own. The work package manager is responsible for the day-to-day management of the work package related tasks inside a work package and regular reporting to the project manager on the overall status, the progress, the issues, risks and the budget.

Advisory Panel/ External experts An external Advisory Panel (AP) will be established early in the project, bringing together well-distinguished stakeholders that will liaise with the consortium to provide an external view of the progress and results of the project. The AP will provide advice and feedback on the activities and results of **GREENING PORTS**, in particular on Exploitation Plan and Master Plan. This group will be composed of maximum 5 members and will be formed by internationally recognized experts who either are at directly involved in Port Ecosystems, such as European Ports, or EIT Urban Mobility, EIT InnoEnergy or are interested in the real-life benefits that the green shift would bring to their specific sector. Their expertise and independent assessment are expected to guide the project in accelerating the societal acceptance and market uptake of services demonstrated. On top of regular exchanges coordinated from WP0 (see WP0.5 description), the major physical interactions of the AP and **GREENING PORTS** will take place during the 2 technical workshops that will be organized in conjunction to the general assembly of the project. Members of the AP are listed in Section 4-5.

Task force This task force governance will evolve according to the phases of the project (initialization, deployment, replicability). The Port Task force is defined as an innovative port mechanism which acts transversally across the project activities. The Port Task force will deal with five themes led by theme leaders (partners) 1) Digital Services (Capgemini) 2) Energy & Logistics (UNIGE) 3) Environmental Monitoring (Cyprus Institute) 4) Mobility (Factual) and 5) Citizen Participatory Approach (3oClock). In addition, **GREENING PORTS** proposes to involve a “ trusted neutral actor ” in the key meetings (at least Replicability Meeting) of the European Commission (for instance, DG MOVE; DG ENER) and to create a “ lighthouse ” port taskforce which will bring together public and private actors of the port place more strongly involved in the project. Task force is coordinated from WP1 as described in WP1.5 description.

Taskforce Objectives' meeting	Description of the activities	Stakeholders and Partners
Strategic Meeting 1 time per “period” (per semester or per term)	<ul style="list-style-type: none"> • Present the achievements of the previous period • Present the roadmap and budget for the following period • Arbitrate strategic decisions and funding • Identify new financial resources needed • Prepare for replicability (target operating model and business model) • Validate the Master Plan 	attendees at a “strategic” level <ul style="list-style-type: none"> • Port Authority (co-chair) lighthouse • Theme leaders (co-chair) • European Commission representative • Taskforce port " lighthouse " • regional community • Port Authority follower

Management Meeting once a month	<ul style="list-style-type: none"> • Follow the life cycle of the various projects • Coordinate all the themes • Validate the technical orientations of the program • Prepare the strategic committee 	Same attendees as the Strategic Committee but more on an “operational” level
Operational Meeting by theme Once a week or once a month (depending on the theme)	<ul style="list-style-type: none"> • Follow the “project weather” of the theme and remove the blocking points • Ensure the operational monitoring of the project on the various themes • Arbitrate certain decisions before deployment 	<ul style="list-style-type: none"> • Consortium (relevant actors only) • Taskforce of the "lighthouse" port (actors concerned only) • Port Authority follower (actors only) • Theme leader (depending on the theme)
Replicability Meeting 1 time per semester then more frequently	<ul style="list-style-type: none"> • Identify good practices and pitfalls to avoid between ports • Identify possible co-investments between ports • Prepare the replicability within the follower ports and then another port • Build a target governance for each port (“port community”) 	<ul style="list-style-type: none"> • Port Authority (co-chair) lighthouse • Port Authority follower • Theme leaders • European Commission representative

The first month will make it possible to propose adjustments to make this governance concrete. This governance will also be one of the key elements in the constitution of a port community. Specific skills may be recruited by the port authority for accurate tracking of these committees and the program (Chief "Green Port" Officer)

Partner representative. Each partner in the project shall designate a primary point of contact along with a secondary who cover in case of their absence. This role shall be responsible for coordinating and monitoring all project level communication between their organization and other partner representatives within the consortium. Although peer-to-peer and inter-consortia communication shall be encouraged, it is important to have a single reference point to ensure the project-wide view is always considered.

Meetings and General Assembly. Kick off meeting will be held in Toulouse, France, hosted by Capgemini at the launch of the project: 01/01/2022. Final Meeting to be held in Strasbourg in Q3 2026. Three (3) annual General Assembly (GA) events (2 days) during the duration of the project beside the Kick-off meeting to be held by Capgemini as coordinator, in Toulouse, France. and

- 1st General Assembly to be held in Gdynia, in Q1 2023,
- 2nd General Assembly to be held in Cyprus in Q1 2024,
- 3rd General Assembly to be held in Klaipeda in Q1 2025,

Online meetings gathering all partners consortium will be organized every year starting M6. So, consortium will meet every 6 months physically at GA virtually at online meeting.

Project Innovation & Exploitation Management In the approach to maximise the impact of the project results and its exploitation, **GREENING PORTS** will dedicate under the WP0 “Management” a task named **Innovation & Exploitation Management**. This task will map the suitable business model-based service, and it is seen as way of enabling new applications and business opportunities to enable new and innovative business opportunities. The definition of the Business Plan service based as a foreseen activity during the execution of the project will be delivered at M30. The expression Innovation management is used to share the benefits of European research and development, making related space sector technologies available to the larger industry and as a way of enabling new applications and business opportunities. During the project, Stéphane Mely from CG, will be in charge of the Innovation & Exploitation management and in particular he will take care of the technology transfer related issues.

Interface with EC

Capgemini as coordinator will perform the interface with the EC by several means presented in the management procedures: progress and review meetings, progress reports, data packages including the project deliverable items identified for each review. Immediate communication of any problem or abnormal circumstances detected during the course of the project could be directly carried out with the EC. The potential impacts on the achievement of the project objectives will be evaluated and internally discussed before informing the EC and before proposing an action roadmap for the correction. A justification, an updated schedule and the assessed technical risks will be provided to the EC. An attention will be particularly drawn to minimize the impacts to not delay the time to market. All contractual communications shall be by fax or email as agreed. Telephone and e-mail shall be normally used for day-to-day communications

Project Risks Management As a Innovation project certain element of technological or market failure is assumed. Managing and mitigating risk within the Greening Port project will be treated as a core project management task in accordance with best practice. Therefore, the following risk management processes will be carried out:

1. Risk Identification determines and documents the risks that may affect the project;
2. Quality Risk Analysis prioritises risks by assessing and combining probability of occurrence and impact;
3. Risk Responses defines mitigation and contingency actions for the risks that will not be avoided;
4. Risk Monitoring and Control implements the risk response plans, tracks risk, monitors residual risks, identifies new risks and evaluates risk process effectiveness throughout the project.

Risk identification and analysis will be carried out by considering areas of uncertainty that may impact the scope, time, cost and quality throughout the Greening Port project life cycle. The partners, through the WP leaders, will strive to increase transparency regarding dependencies and exposures (activities, time, resources, and cost). The initial main risks of **GREENING PORTS** are listed in the table below. This table will be reviewed and updated frequently by the consortium. Risk status is addressed in all project committees, whatever their level, from weekly internal progress meeting to the executive steering committee with client sponsors.

Project Quality Assurance Project Assurance is in charge of the control and verification of the compliance of the project rules defined at kick-off meeting. Capgemini project manager will lead this activity and will be responsible for each member of the consortium in charge of the WP. All project deliverables will be reviewed and assessed in a two steps procedure:

1. Each deliverable will be reviewed by the technical and quality consortium in charge of this deliverable.
2. Consortium reviewing team will perform a final review before the delivery to EC. The consortium maintains the highest standards in delivery quality. One of the basic principles in the implementation of our tasks is the continuing attention to a high-quality standard.

As coordinator, Capgemini provides a Quality and Environmental Management System (QEMS) to ensure the quality of process execution and the management and control of products and services. The following table shows a short description of the quality principles which Capgemini uses in the implementation of its projects. Capgemini operates under its own (ISO 9001 certified) quality management system. The Quality Management System (QMS), project management and quality assurance procedures are designed to be compatible with ISO guidelines. This includes abide by the eight quality management principles defined by ISO45 and regularly engaging in internal audits to identify areas where processes could be improved. The table below is a list of the quality management principles and a short overview of our approach to implementing these principles.

Quality management principle	Implementation
EC centered focused	Regular team company meetings discussing customer needs & requirements and how the consortium can better address these.
Leadership	Clear vision for the consortium in its work within GREENING PORTS Clear business plan with targets and goals for the business and individual team members. Line management relationships for staff members.
Involvement of consortium members	Line management relationships. Open meetings and discussions.
Process approach	Clear objectives. Fully functional and comprehensive project management software. Systematic management of relationships with partners. Regular internal progress meetings during a project. Maintenance of a risk register.
System approach to Management	Clear budgeting and resource allocation. Fully functional and comprehensive project management software.
Continuous improvement	Regular monitoring and evaluation of QMS (system level). Regular monitoring of feedback received. Dissemination of results, feedback and actions.
Factual approach to decision-making	Fully functional and comprehensive project management software. Culture of open information and access for all consortium members.

Mutually beneficial supplier relationships	Regular partnership working. Vetting of partners Open communication channels during contracts and outside specific contracts (e.g. on framework tenders).
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Project Change management

Formal change management process will be performed throughout the project. All changes requested by internal or external partners will be actively managed by the Project Manager and the project management team to ensure that they are assessed for impact and effort of implementation. Based on the assessed impact and effort cost the project management team will decide if they should be accepted, rejected or escalated to the Project Board. If escalated, then the Project Board will have the final decision.

Legal considerations

Legal considerations (IPR): Within the Consortium Agreement, most legal issues pertaining to Ownership, Confidentiality and IPR issues related to resources brought into the project by partners and those developed within the project itself will be dealt with. As stipulated, the Consortium Agreement, based on the Multi Beneficiary General Model Grant Agreement, will be signed by all partners before the beginning of the project. As the issue is complex in this project, given the variety of partners, the background IPR and project developments, identified tasks are dedicated to fully explore the issues of IPR, licensing and eventual access to software/hardware within, after and/or outside the project. Legal considerations are considered under WP0/WP6 for IP law.

Ethical considerations: GREENING PORTS project will address ethical consideration under WP6.1. Ethics guidance will be developed on how the project will reflect the six RRI themes (ethics, gender equality, governance, open access, public engagement and science education) in the design, planning and implementation of its activities³⁶. Services demonstrations and survey citizen engagement will carefully respect GDPR.

Table 3.2a: List of milestones

Milestone	Milestone name	WP	Due date	Means of verification
M1.1	Port task force setup	WP1	M1	One taskforce active for each port
M1.2	Services Road map for each port review	WP1	M12	acceptance of D1.2.1
M2.1.	Current Technological solutions analysis review	WP2	M9	Set up of service portfolio
M2.2i	Current Port Needs Assessment	WP2	M12, M24, M36	Technical assessment of each services of the portfolio
M2.3i	Potential impact Assessment of introduction of such services in port Review	WP2	M12, M24, M36	Decision made by each taskforce of the services to be implemented
M2.4i	Implementation for low carbon energy services, mobility and logistics, and environmental services Review	WP2	M18, M30, M42	Service Prototype ready to be deployed under WP3
M3.1i	Management plan review	WP3	M12, M18	Roadmap of services deployment for each port
M3.2i	Final handover equipment review	WP3	M18, M24, M36	Required equipment installed for demonstration in each port
M3.3i	Functional and technical tests report review	WP3	M24, M30, M42	Successful test allowing services operations
M3.4i	Services demonstration on energy/mobility/logistics	WP3	M28, M34, M46	Successful services operations and user acceptance
M3.5i	Environmental monitoring campaigns review	WP3	M18, M42	Concentration mapping for air pollutants, GHG, PM10 before (M18) and after (M42) services demonstration
M4.1	Dashboard design review	WP4	M12	Acceptance of Design Report
M4.2i	Dashboard releases	WP4	M24, M36, M48	First release M24, updated at M36 and at M48
M4.3	Final impact assessment	WP4	M54	Dashboard “up and running”, validated by port authorities

³⁶ Leveraging RRI tools and guidance, including those from H2020 projects such as: RRI Tools, NewHoRRIzon, RRING GREENING PORTS

M5.1	Master Plan review	WP5	M54	Final acceptance by EC and Roadmap for each port based on Master Plan recommendations.
M5.2	Business Plan and post-project sustainability review	WP5	M54	Completeness of services portfolio exploitation
M6.1i	Data Management Plan Review	WP6	M06, M12, M36	Acceptance of the deliverables
M7.1	Launch of project website	WP7	M3	Website opened and used by a first user community
M7.2	Running the citizen observatories	WP7	M12	Meetings and events to collect feedback from citizen
M7.3	Porthaton Results	WP7	M54	Progress report

Table 3.2b: Critical risks for implementation³⁷

Id.	Description of risk	Likelihood	Work package(s) involved	Effect	Proposed risk-mitigation measures
TC1	Port case scenarios too far away from reality	Low	WP1	No impact or difficulties to implement	Close collaboration with end-users, and real-use case research and laying on TCFD scenarios
TC2	Lack of continuity for services definition, development and deployment	Medium	WP1, WP2, WP3, WP4	Delays, Inconsistency	Role of Task Force under WP1.5 to ensure seamless design and implementation of services
TC3	Lack of homogeneity in the technical architecture of digital services	Low	WP2, WP4	Costs and hard replicability	All services are hosted in a single, existing, and open cloud platform: Wekeo (DIAS meteo)
TC4	Delay on the implementation in the ports due to administrative issues	Low	WP3	Delays	The Coordinator and WP3 leader will have a constant contact with Port authorities and stakeholders to track the implementation. 3 months margin scheduled for procurements.
TC5	The modelling is not able to address the complex process and interlinkages of air quality and GHG emissions to provide robust scientific evidence on the impact of the services implemented	Medium	WP4	Project goals might not be proved	The WP4 coordinator will ensure a proper alignment and communication between the research experiments and the demonstrations conducted in the Ports.
TC6	Other valuable products, services and relevant technologies arrive to the market meanwhile	High	WP1, WP2, WP3	Services may be reallocated	Right Agile/SAFe services portfolio management to prioritize short term and high impact services. Possibility to cancel or to reallocate services implementation
AD1	Port authorities will be reluctant to disclose their environmental data and to be transparent	Medium	WP1, WP2, WP3, WP4, WP7	Wrong prioritization of services, lack of relevance of decision factors	Clear Data confidentiality and information management clause in the Consortium Agreement
AD2	Low traction from “Market” and other ports to replicate services	Low	WP5, WP7	Impact limited to lighthouse and fellow ports	Public relations, dissemination and collaboration with stakeholders.
AD3	Inability to find and agree on a robust business model and exploitation plan	Low	WP1, WP5, WP6, WP7	Commercialization and dissemination delays	Early work within WP1 on identification and drafting different options/alternatives for the business model and exploitation plan

³⁷ Note: L: Low, M: Medium, H: High. TC: Technical, AD: Adoption/Dissemination, PM: Project Management, CO: Consortium

AD4	Lack of commitment of local or regional political decision-makers	Low	WP5,WP6, WP7	Future pilot sustainability is hampered	One-on-one meetings and tailored material to raise awareness of GP as an integrative solution that affects all aspects of the urban environment and align interest of different policy makers.
PM1	Travel and gathering restrictions due to COVID-19	High	All	Project management difficult. Co-production goals can't be achieved	Physical meetings take into account virtual alternatives, including online workshops, ceremonies, working sessions and demonstrations. KPIs will allow neutral estimations vs COVID-19 effects
PM2	Inaccurate budget allocation	Medium	All	Efficiency	Identify necessary re-allocations among partners
PM3	Budget (time/cost) issues due to complexities including integration, infrastructure, connectivity identified solutions and services complexity and upcoming changes	Low	WP2-WP3-WP4	Delays, Costs	The project baseline has been defined from ongoing projects and tested technologies. Team is highly experienced. The process is Agile/SAFe.
CO1	Losing a critical partner at a crucial point in the project.	Low	All	Delays	Industrial consortium constructed with some level of redundant expertise. The most critical skills are available in at least two partners. The consortium members have a sufficient professional network to identify an adequate new partner. Green market is a top priority for most of partners.
CO2	Underperforming partner	Low	All	Delays, Costs	CA with full conflict resolution. Consortium with strong R&D - delivery capacity. Partners with overlapping skills. Persisting issues taken to steering & GA.
CO3	Administrative disagreement, cooperation problems	low	All	Delays, Costs	Task force with Port authorities
CO4	Disputes over ownership of IPR amongst consortium	Low	All	Delays, Costs	CA with full IPR management.

3.3 Consortium as a whole

A total of **26 partners** from **9 EU member states** (France, Germany, Italy, Spain, Greece, Cyprus, Lithuania, Poland, Ireland) forms our consortium. Our Consortium encompasses representatives from the **industry** (CG, AT, TAS, Wartsila), from the **academia** (UNIGE, CNRS, KU), **research centres** (BSC, CERTH, CyI), **legal experts** (DNV GL, HGG), **communication experts** (3OC) as well as a substantial number of **SMEs** (CTI, FCT, FBT, GSH, OnAir, SIARQ, SINAY), and of course the four ports authorities (Gdynia, Klaipeda, Limassol, Strasbourg). The fact that the suggested Consortium consists of a variety of organisations of multinational background, of multicultural environments and with cross-country activities, justifies our huge potential to reach out to different audiences, engage with different stakeholders, and therefore, spread the impact of our work directly to the citizens.

Consortium members' complementarity The project puts together an alliance of industrial, research centres, private innovative actors, stakeholders and port authorities in a robust interdisciplinary consortium: industrial partners (CG, AT, TAS, Wartsila); private and public partners with expertise in space based information (CREOTECH, GSH), in mobility (FACTUAL, ONAIR), in port operations (SINAY, FBT), in energy (UNIGE, AT, SIARQ), research centres highly skilled in air quality and GHG monitoring and simulation (CNRS, CyI, BSC, KU), non-profit legal research society (HGG), international standardization (DNV GL) a service design company specialised in citizen engagement (3OC), as well as a strategic consulting with strong expertise in ports and energy

strategic roadmaps and digital transformation (INVENT). Finally, our Consortium will be reinforced with the presence of third parties, as listed below:

- Nemi, FCT spin off for mobility as services;
- PARKUNLOAD, SME providing mobility solutions for logistics, behind Factual
- CNRS has 2 research linked third parties: Laboratoire Sciences Climat et Environment and Reims University for international well-known expertise in situ real time CO2 network and CO2 emissions inventories.

The team covers in a very balanced way the different expertise domains tackled by the project, as illustrated in the table below:

Expertise Domain	GREENING PORT Partners	What do they bring
Digital solution	CG, TAS, CETH,	Big data architecture, data flow, Artificial intelligence, cyber security
Space Sensors	CG, TAS, CETH, CTI, GSH	Earth Observation, GNSS and UAV
Operational solutions	TAS, AT, CG, CETH, WRTL	System engineering, decision support tool, KPI
Energy	UNIGE, AT, DEMS,	energy flow analysis, green hydrogen, LNG, smart grids applications.
Mobility and Logistics	FCT, SINAY, DEMS, CETH, CTI, UNIGE, WRTL	urban mobility MaaS for ports, dedicated patterns and solutions for ports, low carbon port operations, green logistics,
Environment	GSH, CyI, CNRS, SIARQ, CETH, FBT, BSC	air quality, water quality, noise, real-time monitoring GHG emissions, data modelling-analysis-forecasting, drones mapping in flight and ground operations
Regulation	HGG, DNV GL,	maritime and environmental law, law of the sea and data protection law and IP law, standardization and autonomous shipping guidance.
Sustainability	GSH, INVENT, UNIGE, CG, TAS	Innovative business model, exploitation of the results beyond the project, sustainability expertise
Community Engagement	3OC	Energy, citizen, mobility

Roles and contribution: The following diagram offer a clear illustration with regards to the role and placement of each Consortium partner in the suggested activities.



Figure 18 Expertise of Consortium partners

3.4 Resources to be committed

The GREENING PORTS resources are committed as follow: the technical part of the project for WP1, WP2, WP3 and WP4 will absorb 82.8% of the overall project person/months. To ensure a proper sustainability beyond the duration of the project, the project will emphasize a strong effort also on *Replicability & Exploitation* (3,7%), *Legal, Economic & Standardization frameworks* (3.8%) and

Dissemination activities (4.4%), since the economic and market impact is essential for the partners. Regarding *Management*, WP0 will absorb 5.4% which is an adequate amount without being too onerous. It is worth noting that 55.8% of total eligible costs are dedicated to the most strategic WP2 and WP3 for new services development and deployment in the Ports. Considering the port investments, Fellow ports represent 12.83% of EU Requested Funding, and port 9.82% for Lighthouse

Table 3.4a: Summary of staff effort

Participant #	Participant Short Name	WP 0	WP 1	WP 2	WP 3	WP4	WP5	WP6	WP7	Total PersonMonths per Participant
1	CG	108,00	4,00	7,00	0,00	21,00	10,00	0,00	5,00	155,00
2	PGA	3,00	20,00	36,00	282,00	0,00	0,00	0,00	10,00	351,00
3	KSSA	3,00	12,00	12,00	81,00	0,00	0,00	0,00	10,00	118,00
4	PAS	3,00	15,00	8,00	120,00	0,00	0,00	0,00	8,00	154,00
5	CTL	2,00	10,00	7,00	56,00	0,00	0,00	0,00	4,00	79,00
6	Cyl	1,00	30,00	66,00	18,00	8,00	4,00	0,00	1,50	128,50
7	UNIGE	3,00	21,00	180,00	10,00	7,50	17,00	33,00	1,50	273,00
8	KU	0,50	0,00	74,00	30,00	8,00	0,00	0,00	1,50	114,00
9	CERTH	0,50	0,00	36,00	0,00	49,00	14,00	0,00	1,50	101,00
10	CNRS	0,50	0,00	23,00	17,00	17,00	0,00	0,00	1,50	59,00
11	HGG	3,00	0,00	0,00	0,00	0,00	0,00	46,00	3,00	52,00
12	TAS	3,00	0,00	0,00	0,00	117,00	2,00	0,00	1,50	123,50
13	3OC	3,00	4,00	0,00	0,00	0,00	6,00	0,00	42,00	55,00
14	INVENT	1,00	87,00	0,00	0,00	0,00	6,00	0,00	1,50	95,50
15	DNVGL	0,50	0,00	28,00	0,00	3,50	2,00	16,00	1,50	51,50
16	GSH	3,00	7,00	0,00	16,50	0,00	35,00	5,00	1,50	68,00
17	DEMS	1,00	0,00	36,00	0,00	18,00	0,00	0,00	1,50	56,50
18	AT	3,00	26,00	51,00	167,00	25,00	0,00	0,00	1,50	273,50
19	FCT	0,50	4,00	16,00	4,00	8,00	4,00	0,00	11,00	47,50
20	ONAIR	0,50	0,00	40,00	0,00	16,00	0,00	0,00	1,50	58,00
21	CTI	0,50	0,00	0,00	52,00	4,50	0,00	3,00	1,50	61,50
22	SINAY	0,50	0,00	31,00	15,00	20,00	0,00	0,00	1,50	68,00
23	SIARQ	0,50	0,00	35,00	15,00	7,00	0,00	0,00	1,50	59,00
24	BSC	0,50	0,00	40,00	15,00	9,00	0,00	0,00	1,50	66,00
25	FBT	0,50	0,00	0,00	24,00	3,50	0,00	0,00	1,50	29,50
26	WRSL	1,00	0,00	5,00	20,00	0,00	0,00	0,00	1,50	27,50
TOTAL		146,50	240,00	731,00	942,50	342,00	100,00	103,00	120,00	2725,00

Table 3.4b: ‘Other direct cost’ items (travel, equipment, other goods and services)

The table below describes for each participant if the sum of the costs for ‘travel’, ‘equipment’, and ‘goods and services’ exceeds 15% of the personnel costs for that participant (according to the budget table in section 3 of the proposal administrative forms).

ALTRAN	Cost (€)	Justification
Travel	250 000	10K for General Assemblies participation + 240K for travels related to deployment of services in the 4 port infrastructures
Equipment	16 000	Software licences costs
Others good and services	7 500	Audit cost
Total	273 500	
FBT	Cost (€)	Justification
Travel	10 000	General Assembly participation
Equipment	18 000	Components procurement
Others good and services	6 000	Consumables and publications
Total	34 000	

SIARQ	Cost (€)	Justification
Travel	25 000	Travel to Cyprus for WP2.6 / Field demo (GDYNIA) start/end of project
Others good and services	62 000	60K for components procurement for 2 ports, 2K for publications
Total	87 000	
GDYNIA PORT	Cost (€)	Justification
Travel	90 000	Numerous meetings with WP2 partners. + General Assemblies participation. 2 Learning expeditions to EU Port (Valencia, Rotterdam) for a team of 3-4 persons for 2-3 day trips.
Equipment	298 000	Drones and drone sensor (CO2 sensor, multispectral camera, thermal imaging camera), Costs of materials, connections and assembly, Software and Training in the use of software, Additional costs related to installation of solutions (crane rental)
Others good and services	18 000	General Assembly organization, Audit cost and provision for consumables
Total	406 000	



Greening Ports, act for an inclusive and sustainable future

List of participants


Participant	Participant organisation name	short name	Country
1 (coord)	Capgemini Technology Services	CG	France
2	Port of Gdynia Authority S.A.	PGA SA	Poland
3	Klaipeda State Seaport Authority	KSSA	Lithuania
4	Port Autonome de Strasbourg	PAS	France
5	Eurogate Container Terminal Limassol limited	EUROGATE CTL	Cyprus
6	The Cyprus Institute	CyI	Cyprus
7	Genova University	UNIGE	Italy
8	Klaipeda University	KU	Lithuania
9	The Centre for Research & Technology, Hellas	CERTH	Greece
10	Centre National De La Recherche Scientifique Cnrs	CNRS	France
11	Hugo Grotius gGmbH	HGG	Germany
12	Thales Alenia Space France Sas	TAS	France
13	Three O'clock	3OC	France
14	Capgemini Consulting	INVENT	France
15	DNV GL Italia Srl	DNV GL	Italy
16	Geosystems Hellas	GSH	Greece
17	Capgemini Dems France	DEMS	France
18	Altran Technology & Engineering Center	AT	France
19	Factual Consulting Sl	FCT	Spain
20	On AIR S.R.L	ONAIR	Italy
21	Creotech Instruments	CTI	Poland
22	SINAY	SINAY	France
23	Studio Itinerante Arquitectura Sl	SIARQ	Spain
24	Barcelona Supercomputing Center	BSC	Spain
25	Fine Bubble Technologies Sp. Z O.O.	FBT	Poland
26	Wartsila Voyage Limited	WRSL	Ireland

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4. Members of the consortium

4.1. Participants (applicants)

Capgemini Technology Services	
Description of the organisation	
<p>As a global leader in consulting, technology services and digital transformation, Capgemini is at the forefront of innovation to address the entire breadth of its clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 40-years specific expertise in the space sector which covers the entire value chain, Capgemini enables the whole space ecosystem to realize their ambitions through an array of services from strategy to operations. Supported by 350 experts located in our Toulouse site, our services based on our specific skills as an integrator combined with our digital expertise on cybersecurity, GDPR compliance, cloud, data analytics, and artificial intelligence address the challenges faced by the space core business.</p> <p>Since April 2008, the Capgemini Space unit has set up the Cluster Science, gathering + 20 scientists (PhDs researchers) to foster collaboration with the international scientific and technological communities and thus support the bridge between R&D and industrial worlds. Five main streamlines are addressed: Observation of the Earth's, Oceans, Land, Atmosphere and Cosmos. The Cluster Science ensures the operational implementation of scientific results in close collaboration with research centres across Europe. The overall innovation goal of the Cluster Science relies on the transfer of skills between research and industry to foster the improvement of Big Data technologies and the framework to integrate scientific algorithms, in a cloud infrastructure.</p>	
Relevant skills/experience/technologies	
<p>Relevant to this proposal, it is worth noting that the Scientific Office develops data processing algorithms for Earth Observation (radar, optical, with Sentinel-1-2-3-5p, Landsat, Radarsat, Envisat, SPOT, Pleiades, MERIS, MODIS, SWOT, etc.) and carries out data analysis from other domains (industry, aeronautic, etc.), while it also defines models to discover and extract added value from huge datasets. Regarding data science, Capgemini has accumulated an expertise both at "basic" machine learning algorithms (classification, clustering, regression, recommender systems, etc.) and at advanced algorithms (e.g.: neural networks, advanced optimization, descriptive and predictive analysis) that are designed by mathematicians from the Science Cluster.</p>	
Role in the project	
<p>Capgemini will act as coordinator of GREENING PORTS project, under the WP0 activities. to Capgemini will lead the overall technical coordination and the project management under WP0. In addition, Capgemini will be involved under WP1 regarding the proposed services' design. This contribution also implies the architecture leading to the overall solution under WP2.7. Also, Capgemini will provide enhanced features based on Copernicus products as inputs supporting WP4 activities (WP4.1 and WP4.3). In addition, Capgemini will contribute to the replicability and communication activities covered by WP5 and WP7. Finally, Capgemini will participate to the Port TaskForces, ensuring transversal consistency in the activities around digital services.</p>	

Key personnel
<p>Stéphane MELY (M) - Business Consultant Manager:</p> <p>Stéphane is Graduated from the INPG – ENSIMAG (IT & Applied Mathematics) Grenoble (France) in 1989, Stéphane started as a software engineer on Energy & Utilities on several EDF (French Electricity provider) and export power plant providers. Then he joined the space industry where he has been working since 2000 in Earth Observation, GNSS and Search & Rescue projects for CNES, ESA, AIRBUS and TAS. He then led Capgemini Space Unit for 10 years with sounding successes, such Galileo Search & Rescue Ground Segment, Pleiades HR programming chain, One Web Manufacturing Test Intelligence projects. Extending his range of activities, he got involved in future Ground Segment, Cloud, Big Data / Machine Learning projects. Currently promoted to Space Business Partner, he is setting up collaborative IT projects at National and European scale, focusing on innovative and disruptive technologies. In the context of this project, he will manage WP0 Coordination of the consortium.</p>
<p>Roger RUTAKAZA (M) - Senior IT Architect :</p> <p>Roger has more 20 years of experience on Industries, Space and Aeronautic domains. He masters JEE (Java), RDBMS, SOA, and distributed systems and Micro services technologies. His experience comes from projects implemented for CNES, ESA, Airbus, Snecma and other major actors of industries, space and aeronautic domains. In the context of this project, Roger will be ensuring the overall technical solution consistency from the design in WP1, the implementation of the services WP2 towards the demonstration in WP3 and the assessment in WP4.</p>
<p>Delphine NOBILEAU (F) – PhD.:</p> <p>Delphine is graduated in a PhD in atmospheric Remote Sensing since 2005, Delphine has been working on ocean color, detection and optical properties on dust aerosol, tropospheric methane detection with IASI sensor, surface land temperature, and radiative transfer and inversion simulation on visible -TIR domain. Delphine has a +15 years of processing and interpretation of optical imagery and in this project, she will act as the scientific reference expert.</p>
<p>Sébastien Nouvellon (M) – Project Manager :</p> <p>Sébastien has graduated from INSA (IT), Rennes (France) in 2000. He has started working as a software developer and technical leader/architect, and then became Engagement Manager on international projects. For 15+ years, he has been involved in space industry for clients such as European Space Agency, French space agency CNES, EADS. He has also managed projects H2020 project for the European commission , in the clean energy sector. He has an important technical background allowing to manage technical teams, and drive design and architecture phases. Sebastien will contribute to activities WP0 coordination of the consortium</p>
<p>Dr. Carine SAUT (F) – PhD.:</p> <p>Carine is graduated PhD in Atmospheric Chemistry from the University of Toulouse (France) in 2003, Carine worked as a post-doctoral fellowship researcher at Harvard University (USA). Then, for the past 10 years+, she has fully orientated her career towards the European R&D projects management. Now, she is currently business developer for science & space applications in the European context (Copernicus and Horizon2020, DIAS frameworks). Linking Science & Earth Observation / IT Big Data/ Market Trial, her focus targets new usages of satellite data combined with other data sources to lead to innovative business model by creating value on data. In this very project, Carine will carry out some of the management tasks funder WP0.</p>
Relevant Projects
<p>S2S4E Climate Service for Clean Energy, European Commission, 2018-2021 :</p>


The main objective of S2S4E is to make the European energy sector more resilient to climate variability and high impact events by exploring the frontiers of what can be achieved by using sub seasonal to seasonal (S2S) predictions offering a new decision support tool based on S2S climate predictions. In addition, S2S4E contributes for the expansion of climate services to users and markets as its development is based on a user-centric framework for co-design and co-development. This objective has been achieved through the development of S2S climate predictions tailored to users' requirements and provided as a Decision Support Tool (DST) which has been co-designed and co-developed with relevant users. This task has been led by Capgemini.

Biomass Mission Analysis Platform, European Space Agency, 2018-2020 :

Within the context of the Biomass Mission to be launched in 2022 and having the objective of quantifying changes in terrestrial forest biomass, using P-band synthetic aperture radar (SAR) measurements. The challenge to tackle is to take full advantage of the amount of data that Biomass and NISAR Missions will provide, by developing new ways of working for scientists, focusing more on data exploitation than data acquisition. The proposed solution currently carried out is to define and to set up a collaborative platform hosted on cloud integrating L2 algorithms, to foster communication and exchange among the scientific community. This platform is called BIOMASS Mission Analysis Platform (B-MAP). On-going collaboration with NASA and ESA are carried out to define a joint platform to provide a collaborative platform merging NISAR and BIOMASS products.

Copernicus ASSIST, European Center for Medium Weather Forecasts ECMWF, 2018-2020 :

Our solution led by Capgemini in collaboration with INERIS and the Barcelona Supercomputing Center offers aircraft maintenance improvements via the related impact of particles during flights and on ground. This service provides indicators to help airlines companies and manufacturers saving cost with a precise monitoring of the plane exposure to harmful particles and subsequently allowing them to optimize aircraft maintenance plans. ASSIST offers indicators - corrosion, abrasion and blockage considering any disturbance of the environment, enabling a near real time and precise monitoring. The solution does not require any instrumentation over aircrafts, we only use flight tracks and *Copernicus Atmospheric Monitoring Service* to feed environmental composition information.

Port of Gdynia Authority SA	
Description of the organisation	
<p>The Port of Gdynia Authority SA (PGA SA) is a public service company established in 1999 by the representatives of the Municipality of Gdynia and the State Treasury and it has been serving as a managing body of the port since that moment. It directly manages the areas where the operating companies in which a PGA SA holds shares and other independent entities carry out handling and storage operations. The company carries out the objectives set out in the Act on ports and harbours, such as, inter alia, management of the property and port infrastructure, forecasting and planning the port development and the maintenance and expansion of the port infrastructure, while ensuring adequate standards of safety of persons and cargo handling as well as keeping the environmental standards. The Port of Gdynia is a universal modern port specializing in handling general cargo, mainly unitized cargo transported in containers and in a ro-ro system, based on the well-developed network of multimodal connections including hinterland, regular Short Sea Shipping Lines as well as ferry connections (ferry terminal). The Port of Gdynia is an important link in the Corridor VI of the Trans-European Transport Network (TEN-T).</p>	
Relevant skills/experience/technologies	
<p>The Port of Gdynia is an international modern port. Here below, a brief description of the port :</p> <p>Basic navigational and technical data: Maritime entrance to the port is 150 m wide with a depth of 14.0 m, total port area: 973.1 ha, including 621.5 ha land area (274.0 ha managed by PGA S.A.), total length of quays: 11.7 km, max. draught along the quays: 13.0 m. The quays at the Port of Gdynia are 17,700 meters long, of which over 11,000 are used for handling operations.</p> <p>Location of the Port: Geographical coordinates 54°32' N, 18°34' E.</p> <p>The Port of Gdynia has very favourable navigation conditions. Roadstead - protected by the Hel Peninsula, which is a natural year-round shield for the anchored vessels, the 2.5 km long outer breakwater and a 150 m wide and 14 meters deep entrance to the port make the port easily accessible from the sea. The Port of Gdynia is a warm water port, where there are no tides. The water level may rise by 60 cm during the strong westerly winds, or fall by about 60 cm during strong easterly winds. Pilotage is compulsory for the vessels over 60 meters in length, towing is compulsory for the vessels over 90 m in length and for over 70 m long ships carrying dangerous cargo. Vessels over 40 m in length shall be assisted by the port mooring workers.</p> <p>Handling of the containerized cargo at the Port of Gdynia is the domain of two modern container terminals located in the Western Port: Baltic Container Terminal Ltd. and Gdynia Container Terminal S.A.. There are also - equipped with modern cargo handling equipment - bulk terminals: Baltic Grain Terminal Ltd, Maritime Bulk Terminal Gdynia Ltd., Baltic Bulk Terminal Ltd., Aalborg Portland Poland Ltd., Koole Tankstorage Gdynia Ltd. and Onico Gas. OT Port Gdynia Terminal Sp. z o.o., is specialized in handling general cargo. It consists of two terminals - part of OT PORT is dedicated to handling ro-ro cargo (within Basin V of the port of Gdynia) and the other part to handling conventional general cargo.</p> <p>Measurement of the environmental levels of substances or energies: in accordance with the Regulation of the Minister of the Environment of 16 June 2011 concerning the requirements for the measurement of the environmental levels of substances or energies performed by a road, railroad, tramway, airport or port management company (Polish Journal of Laws Dz. U. of 2011 no. 140 item 824), Port of Gdynia Authority S.A. carries out biannual assessments of contaminant levels in the dock waters using 28 measurement points. The following parameters are measured in the harbour waters: Biological Oxygen Demand (BOD₅), Chemical Oxygen Demand (COD), pH, Suspended solids, Lead, Cadmium, Zinc, Petroleum hydrocarbons.</p>	

The **water contamination measurement** in the docks is performed for reference substances and parameters, according to the reference methodologies specified in the Regulation of the Minister of the Environment of 21 July 2016 concerning the method of classification of the status of surface water bodies and the environmental quality standards for priority substances (Polish Journal of Laws Dz. U. of 2016 item 1187). One of the factors affecting the cleanliness of harbour waters is storm water management. The Port of Gdynia Authority S.A. has largely modernised the storm water system whose outlets are located in the docks. Currently, 70 percent of the outlets from the storm water system are equipped with pre-treatment systems and have been given suitable water law permits. Ultimately, all the storm water outlets in the Port of Gdynia will be modernised and equipped with pre-treatment systems, even if the inspections that were conducted so far did not indicate any exceeding of the norms.

UAV use - the Port of Gdynia is in possession of an own high-performance drone that can be used to collect high-resolution image data (orthogonal and oblique). Such data is a great basis for provision of terrain/land view service (orthophoto map) and at the same time for generation of dense 3D point cloud. The data may be periodically updated according to actual needs. Such solution may enhance the management and decision-making processes providing capabilities such as: providing views of the Port of Gdynia terrain on a clear, high-resolution orthogonal images, fully measurable in 2D; views of the Port of Gdynia terrain in the form of 3D point cloud, fully measurable in 3D; multispectral imagery and various EO indices calculation for selected areas. Furthermore, the drone is equipped with sensors checking the air quality (PM2.5, PM10, air humidity, temperature, PPM, hPa, gas concentration), thus enabling the constant monitoring of the environmental pollution. The drone has also a modular structure that allows for supplementing the sensors depending on actual and additional needs.

Role in the project

The Port of Gdynia will take up the role of the Lighthouse port, focussing mostly on the needs' definition and practical assessment of the solutions proposed during the course of the project in the areas of energy efficiency improvement including alternative fuel use, efficient logistics for container terminals and traffic flow optimisation, noise and air pollution reduction, light smog. Selected solutions will be practically implemented as/if feasible and verified by the port in daily operations and also in the course of the significant planned port extension - construction of the Outer Port, which has just been initiated. Recommendations and project products will be taken into use both at the coming design stage and during construction activities (expected to start at the end of the project). Special attention will be given to ensure the largest possible extent of the cooperation with independent entities (tenants) conducting cargo handling operations (both by setting up formal requirements in line with project developments and by added value based arguments – showing the benefits coming from the new solutions).

The Lighthouse involvement in WP0, WP2, WP3 and WP7. Details participation are given here above

Task 3.3 – Lighthouse deployment;

Environmental Services: GREENING PORTS will monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Gdynia port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and offshore and onshore UAV-based samplings. These campaigns will allow concentration mappings for air pollution, GHG, and PM10. We will measure and map noise propagation thanks to SOLAR HUB network implementation (see here under). If studies show interest for further precision, GDYNIA Port proposes to install additional sensors (~20), design new feature noise calculator, and issue noise propagation maps, updated every 10-30 minutes. The definition of level of noise models will allow application of legal standards to terminal operations and to construction works.

We will study and develop solutions for waste and ballast water cleaning systems and install demonstrators, and manage projects to adapt following technologies for GDYNIA Port. The results of the tests during the demonstration period will be used to make a proposal for full scale waste and ballast water cleaning systems including a cost / benefit analysis.

Mobility Services: construction of a charging station (e.g. for scooters) to limit car traffic inside the port and in the immediate vicinity of the port. On-demand mobility service - we will develop an on-demand bus service connecting port premises to GDYNIA main street and a transport hub using its linked third-party NE-MI mobile application.

Energy Services: we will study, specify for purchase and manage projects to adapt following technologies for GDYNIA Port: PV Cells and/or wind turbines: practical use in the newly designed infrastructural investment: “Construction of the Outer Port in the Port of Gdynia” and other places in Port of Gdynia; H2 Production and storage (feasibility study); heat Pumps and Dimmers for buildings.

Energy Simulations: of solar&wind production with storage/charge facility, connection between existing grid and the new grid for energy management using ENERGISME platform integrated in the dashboard (WP4)

Solar Hub: deployment will be done through a Pilot of 10 units covering 2,5km2 including sensors for CO, CO2, NO2, SO2, PM10, PM2.5, O3, Noise and traffic and mobility flows. Also, the infrastructure deployed will be generating solar light depending on the Gdynia port needs. Its components are Plug & Play. The components connect and after startup, it will start to send data to the Cloud using LoRa WAN communication technology or any other that is defined. This data will be immediately visible on the Urban Brain digital platform. The Urban Brain platform will allow controlling and monitoring remotely the information gathered by the sensors

Key personnel

KATARZYNA HLEBOWICZ-WOJCIECHOWSKA (F) - Head of the Environmental Protection Department:

Katarzyna HLEBOWICZ-WOJCIECHOWSKA is graduated from Gdańsk University of Technology from the faculty of drug biotechnology protection in 1990. She had been academic teacher at the Gdańsk University of Technology by 1998. Since then, she has been working in the Port of Gdynia Authority S.A. as manager of the environmental protection department. Among others, Katarzyna is responsible for the organization and management of the port’s reception system for ship generated waste, and for the implementation of new environmental protection standards in the port in accordance to the European Union standards, as well as for the cooperation with international organizations (such as BPO, ESPO), managing the work related to the environmental impact assessment (EIA) processes for planned investments, etc. The Environmental protection department represents the Port of Gdynia Authority in few EU projects dedicated to the Baltic Sea Region.

DARIA MRÓZ (F) - Environmental Protection Specialist:


Graduated from Gdańsk University, the faculty of environmental protection in 2001, Daria has been working in the Port of Gdynia Authority S.A. as an environmental protection specialist. She is responsible for air pollution, ship generated waste management, biodiversity, noise emission, supervising large infrastructural investments like “The construction of a public ferry terminal in the Port of Gdynia”, “Construction of port infrastructure for sanitary sewage collection” etc. Daria is member of The HELCOM Cooperation Platform on ports reception facilities in the Baltic Sea BPO Environmental Working Group.

EDYTA BIAŁOWAŚ (F) - Environmental Protection Specialist:

Edyta graduated from Gdańsk University, the faculty of oceanography in 2002 and since then, she has been working in the Port of Gdynia Authority S.A. as an environmental protection specialist. She is responsible

for ship generated waste management, contingency management plan, port waste management, obtaining decisions on environmental conditions, noise emission, supervising large infrastructural investments: Extension of railway access to the western part of Gdynia Pot – reconstruction and electrification” etc. Edyta is member of the Climate Pilot Group launched by the Ministry of Environment.
MICHAŁ ŚWIECZKOWSKI (M) - Head of the Security and Monitoring Department: Michał graduated from the Gdańsk University of Technology, the faculty of European studies and the Naval Academy in Gdynia, major in internal security. For nearly 3 years, he has been associated with the Port of Gdynia. The knowledge gained during his studies and the experience gained allowed Michał to specialize in security of sea ports. From the very beginning, he got strongly involved in securing critical infrastructure for drones and analyzing the possibilities of using unmanned platforms to ensure security. He is also author of one of the first procedures in Poland for obtaining permission to fly over a sensitive infrastructure facility.
BARTOSZ LANGOWSKI (M) - Antidrone Systems and Unmanned Aerial Vehicles Specialist: Bartosz is a graduate from the University of Gdańsk, Faculty of Social Sciences - Political Science, faculty of Economics - European Integration. European Union Aid. He has an Aviation Personnel Qualification Certificate authorizing him to perform BVLOS flights with unmanned aerial vehicles with an MTOM of 25 kg. Currently, he works in the Department of Safety and Monitoring of the PGA S.A. as an Anti-Drone Systems and UAV Specialist. He is the deputy manager of the HNS information point. In his work he also deals with performing UAV flights at the Port of Gdynia, monitoring UAV traffic in the port space and maintaining contacts with entities competent in the field of port security. As the head of the task force, he is leading a project to use UAVs in the key infrastructure areas.
Relevant Projects
Water Innovation System Amplifier (WISA): Test-beds for water innovation , co-financed by the European Union under the Interreg South Baltic programme, 2014-2020
COMODALCE – Enhancing coordination on multimodal freight transport in Central Europe , funded by the Interreg Central Europe programme, 2014-2020
Completing management options in the Baltic Sea region to reduce risk of invasive species introduction by shipping- COMPLETE , funded by the European Regional Development Funds, INTERREG Baltic Sea Region Programme, 2014-2020
Maritime safety – Transport and Environment in the Baltic Sea Area , Baltic Master II, funded by the European Regional Development Funds, INTERREG Baltic Sea Region Programme, 2007–2013
Relevant publications and products
„Feasibility study with technical documentation for an intelligent truck traffic management system at the Port of Gdynia” This project received funding from the financial instrument CEF Transport 2018 "Connecting Europe"
„Underwater noise in Gdynia harbour during piling“ – Zygmunt Klusek i Piotr Kukliński - Institute of Oceanology PAS, Daria Mróz – Gdynia Port Authority, Bartosz Witalis – National Marine Fisheries Research Institute
„Testing monitoring methods for Non-indigenous species in Baltic ports“– Published by: HELCOM – Baltic Marine Environment Protection Commission 2015
ResearchGate „Models for determination of ballast water discharges in Port of Gdynia“– May 2011 LINK - https://www.researchgate.net/publication/286623207_MODELS_FOR_DETERMINATION_OF_BALLAST_WATER_DISCHARGES_IN_PORT_OF_GDYNIA

Infrastructures
Port infrastructure – 973.1 ha of port terrain and 17,700 m of quays (out of which 11 km are used for cargo handling), vehicles, offices
UAV system including own high performance drone capable of water samples collection and able to carry various types of sensors (air quality monitoring system: PM2.5, PM10, air humidity, temperature, PPM, hPa, gas concentration, rgb camera)); drone detection and operations monitoring system including active anti-drone radar able to detect active UAVs and locate their operators (if actively controlled).
<p>The Port of Gdynia Authority S.A. cooperates with the Polish company SeaData (https://seadata.eu/#about). SeaData is based in Gdynia and specializing in data science, atmospheric modeling, analytical systems and IoT solutions. SeaData's main focus is on environmental protection. Its team has created an innovative tool, which - based on the weather forecast and local environmental conditions – it predicts the risk of dust dispersion from bulk cargo maintenance and operations. This tool enables the users to implement safeguard measures on time and plan their activities accordingly.</p> <p>Air pollution monitoring system in the Port of Gdynia has been implemented in the vicinity of HES Gdynia Bulk Terminal Sp. z o. o. The system consists of 6 yetiboxes and analitical platform yetisense which - on the basis of weather forecast - helps us predict dust emissions. The results of air quality measurements are available online: https://www.port.gdynia.pl/pl/ochrona-srodowiska/monitoring-srodowiska/415-zegary-z-aktualnymi-pomiarami-srodowiska</p>

<p>State Enterprise Klaipėda State Seaport Authority (eng. title) VI Klaipėdos valstybinio jūrų uosto direkcija (LT original title)</p>	 <p>PORT OF KLAIPĖDA</p>
<p>Description of the organisation</p>	
<p>KLAIPĖDA PORT is Lithuania's largest transportation centre providing all maritime business services: stevedoring, shipbuilding, ship repair, logistics, cargo forwarding and agency services, etc. The Port is situated at the crossroad of two international transport corridors and serves as a bridge between the CIS, the Asian regions and the Europe. Klaipėda State Seaport Authority (established in 1991) assures the efficient management, systematic development of the port coherent implementation of the maritime policy. Klaipėda Port is a state port: port land, port waters, hydrotechnical installations, navigational fairways and all infrastructural facilities belong to the state. Klaipėda State Seaport Authority controls and develops these objects and areas, while private port business companies operated in leased port territory.</p> <p>The main functions of Klaipėda State Seaport Authority are : to efficiently use and control the maritime state owned property, to ensure navigation safety, to develop port infrastructure, to collect port dues from vessels calling at the port, to lease state-owned land to the companies operating in the port, to construct and renovate quays and piers, to dredge the port waters, and to develop the infrastructure of the port. Klaipėda Port is an ice-free, multipurpose operating 24/7. It is a deep-water port of the depth of -15,5 m. The multipurpose port has 33 specialized terminals, which allow it to handle all types of cargo. The annual capacity of Klaipėda Port is over 70 million tons. The port is capable of accepting large-tonnage vessels: - dry-cargo vessels up to 100,000 DWT, tankers up to 160,000 DWT, containerhips up to 12 000 TEU's.</p> <p>The port of Klaipėda can accommodate vessels up to 400 m in length and with a maximum draught of 13,8 m. It maintains trade relations with 65 countries. Cargo declaration, border and customs clearance is carried out electronically through the sophisticated Port Community Systems. It accelerates freight transportation, facilitates stakeholders' work and increases the port's competitiveness. International Ship and Port Facility Security Code (ISPS Code) is introduced in Klaipėda. The terminals of the Port operate in compliance with the ISO 9000 and 14000 standards.</p> <p>Klaipėda port has LNG terminal and LNG bunkering station, which is operated by the Electric locomotives used by a stevedoring company. Rail traffic (locomotives) generates a large amount of GHG. One of the stevedoring companies in Klaipėda Port has recently acquired an eclectic locomotive to reduce GHG. This improvement proved to be efficient; therefore, the company plans to buy some electric locomotives. This primarily reduces CO2 emissions, but also demonstrates to other stevedoring companies the efficacy and efficiency of this solution.</p> <p>CO2 reduction from pleasures boats : Maritime tourism has been developed in Klaipėda since the last ten years. There are 3 large marinas in the port and one more marina will be constructed in the future, in the southern port land (which will be reclaimed). Over 500 pleasure boats are docked in 3 marinas simultaneously, however this number of pleasure boats has been constantly increasing. An electric driven pleasure boat will be launched in Klaipėda in 2021 (within ES ELMAR project). Developing the charging infrastructure network in Klaipėda port and in adjacent to marinas will be launched, which will result in pleasure boats electric market and shift of 10-25% of pleasure boats to use electric drives. This will</p>	

considerable reduce GHG not only in the port, but also in the sensitive natural UNESCO sites where these pleasure boats are frequented and docked.

Electrical supply station for electric-driven cars near the head-quarters of Klaipėda State Seaport Authority : Excellent example has recently been introduced in 2019, striving for greener and cleaner air and reducing CO₂. Klaipėda State Seaport Authority is frequently visited by thousands of clients, staff, and visitors. In 2019, electrical supply station for electric-driven cars was built. The service is provided free of charge and motivates and promotes electric car use whereas it reduces pollution of air in the approaches of the port and city.

Relevant skills/experience/technologies

Klaipėda Port is a multipurpose, deep-water port located on the Eastern coast of the Baltic Sea. It is the only port of Lithuania, the country's largest and the most important transportation hub.

Location of Klaipėda Port: Geographical coordinates 55°43' N, 21°06' E.

Main navigational and technical characteristics of the port: currently the port entrance channel is 250 m wide and 15.5 m. deep. Klaipėda Port has excellent navigation conditions, located in Klaipėda Straits, which is protected by the Curonian Spit. There are no tides in Klaipėda Port. The total port area is 1442,1 ha, which includes 557,2 ha land area and 884,9 water area. Total length of quays: 24,7 km, max. draught along the quays: 13.8 m. A total of 14 large stevedoring, shipbuilding and ship repair companies operate in the port. There are 33 specialised terminals: 2 container terminal, 2 oil terminals, 2 ro-ro terminals, 5 general cargo terminals, 4 dry bulk cargo terminals, 1 cruise terminal, 1 LNG terminal, 4 general cargo terminals.

Klaipėda Port guarantees **excellent accessibility to the markets**, which provide opportunities for the growth and expansion of trade business. It is a transport crossroad between the EU, Scandinavia and the CIS market: 13 shipping lines connect the port with Scandinavian, German and other European markets; 6 intermodal shuttle trains connect the port with European, the CIS and Asian markets; 1520 mm railway track gauge guarantees rail connectivity with the CIS markets.

Environment protection system : The Law on Environment Monitoring of the Republic of Lithuania is the fundamental legal act which allows the authorities to identify sources of pollutions, amounts of emissions, outlets and discharges by industries, prevention and mitigation means, methods and tools.

In Klaipėda Port, there are 4 levels of **environment monitoring**. The first, city monitoring carried out by *Klaipėda Municipality* to identify general environmental situation in the city. The second, state Baltic Sea monitoring carried out by *the Environmental Protection Agency* within port area and its approaches of the Baltic Sea. The third, port activity monitoring carried out by the port stevedoring companies: based on their activities specific monitoring programmes are carried out. And the fourth, port monitoring carried out by *Klaipėda State Seaport Authority* to identify general environmental situation in the port.


Klaipėda State Seaport Authority carries out regularly port monitoring in Klaipėda Straits, port waters, enclosed port areas, port entrance (in and outside the port). The following objects are being monitored: Water column (pH, CaCO₃ Cd), O₂, PO₄³⁻, P(b), NH₄³⁺, N(b), NO₂⁻, NO₃⁻, ChDS, BDSn, oil products, metals – Cu, Zn, Ni, Pb, Cr, Cd, Hg, temperature, salinity, transparency, concentration of drawing material), hydrological and meteorological analysis); bottom sediments (Granulometrical composition – oil products - metals (Cu, Zn, Ni, Pb, Cr, Cd, Hg, V, As, Sn); polychlorinated biphenyls (28, 52, 101, 118 138, 153, 180); organic tributyl tin (TBA); polyaromatic hydrocarbons, pyrene, benz (gh,i.)perilene, , Phenanthrene); biota: (sort composition, amounts, ;vyraujančios rūšies cheminiai tyrimai: Pb, Hg, Cd concentration in the mussels); costal monitoring: coastal morphometrical indicators, leveling, sedimentation, etc.

The *Environmental Protection Agency* submitted the proposal to *Klaipėda State Seaport Authority* to carry out more sophisticated and intensified monitoring (the programme of which is being now elaborated) for the period of 2021-2025.

<p>Monitoring of air quality of Klaipėda port companies - The following parameters are being monitored: particulates matters (KD2,5, KD10 and SKD), benzen (on <i>ad hoc</i> basis), CO, NO_x, SO₂ (uninterruptedly); common volatile organic compounds (VOCs): ethylen-benzen, xylene, styrene, toluene), heavy metals (Fe, Mn, Cr, Zn, Al, Cu, Pb) sampling 4 times a year and Soil quality measurements (in 4 different locations).</p> <p>Monitoring of environment (water and bottom sediments) - The following parameters are being monitored: pH, dissolving materials BDS7, O₂, nutrients (N, P); oil products; heavy metals; poly aromatic hydrocarbons; other hazardous material: Common Volatile Organic Compounds (VOCs): Polychlorinated biphenyls (PCB), perfluorooctane sulfonic acid (PFOS), Polybrominated biphenyls (PBB), C10-13-chloralkanes, alkylphenols, phthalates.</p> <p>Klaipėda Port has installed 3 air pollution measurement sensors, which measure dusts and noise. These data are automatically uploaded on Klaipėda port website and can be monitored there. The pollution measurements sensors are installed in 3 different port locations. Common volatile organic compounds (VOCs) emission data are also integrated in the Klaipėda port website electronic data.</p>
<p>Role in the project</p> <p>Klaipėda Port takes the role of one of the Fellow ports and will focus on reduction of CO₂ emission and the use of hydrogen as a green fuel in the future.</p> <p>The Fellow port will be involved in WP0, WP2, WP3 and WP7.</p> <p>Task 3.4 – KLAIPEDA Demonstrations;</p> <p>Environmental Services: GREENING PORTS will monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Klaipėda port case. They will be based on fixed recurrent samplings and precise intensive samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM₁₀.</p> <p>Solar Hub deployment will be done through a Pilot of 10 units covering 2,5km² including sensors for CO, CO₂, NO₂, SO₂, PM₁₀, PM_{2.5}, O₃, noise, traffic and mobility flows. PV cells will energise the network to deliver electricity and to route data up to Urban Brain digital platform through the Cloud.</p> <p>Energy services: we will provide feasibility studies for work fleet retrofit and for new green fueled workboats. We will carry out design studies, specifications for purchases in the future and coordination of works and commissioning for the interfaces between port utilities and the small-scale green hydrogen vessels or generation station to demonstrate its technical and financial feasibility.</p> <p>Relevant air measurements will be carried out by Klaipėda University for assessments of GHG reduction effect of electrification of port activities such as stevedoring. KLAIPEDA recently bought 5 electric locomotives and intends to schedule further electrification depending on the demonstration of its efficiency and technical and financial feasibility.</p> <p>Logistics Services: we will assess impact on logistic systems of integrated low-emission energy supply by purchasing an electric hybrid-driven workboat. Due to the frequent (non-stop) use of the workboat, this port case will focus on the technical, financial and operational feasibility, on the reduction of GHG emissions and on supply chain impacts.</p> <p>We will simulate the hydrogen and/or hybrid driven workboat navigation in the port area, interaction with the port traffic, optimization of the boat energy consumption, simulation of the refuelling maneuver and selection of the proper position of the refuelling station, simulation of the communication flows to/from dashboard (WP4).</p>
<p>Key personnel</p> <p>Ms. Kristina GONTIER (F) - International Relations and Protocol Manager:</p>

<p>Kristina GONTIER is a graduate from <i>Vilnius University</i>, MA Linguistics and IMO Port Management Programme. She has been working in <i>Klaipėda State Seaport Authority</i> since 1995. Currently, Ms. Gontier is responsible for and has extensive experience in EU project management and proposal preparation. During 2007-2013 and 2014-2020 Ms Gontier was responsible for coordination, activity and financial management of 10 different projects: East-West TC II, SMOCS, OVERSIZE, PORT INTEGRATION, SUPORTS, Mar Tech LNG, Marriage, ACL, Green Cruise Port, EMMA. She is also in charge of preparation of project proposals and administration of HORIZONT 2020, INTERREG, TEN-T, CEF projects in collaboration with KSSA team, international partners and industry stakeholders. Ms. K. Gontier is also responsible for implementation of <i>Klaipėda Port Marketing Strategy</i>, international cooperation with foreign industry payers, marketing events, etc. K. Gontier is knowledgeable in various aspects of port management, marketing, public relations fields. Her excellent command of the English, French and Russian languages is essential for the EU projects management.</p>
<p>Aleksandas KAUPAS (M) - Environmental Protection Coordinator:</p> <p>Aleksandas KAUPAS started his professional career in KSSA since 1998 and since then held various positions related port waste management and treatment. Currently, Mr. Kaupas is in charge of elaboration and implementations of Klaipėda Port Environment Protection strategy (Green Port Plan). During 2007-2013 and 2014-2020 Mr Kaupas was responsible for coordination, activity and financial management of 3 INTERREG projects in port environment sectors: CLEANSHIP, HAZARD, BSR InnoShip. Mr. Kaupas is a graduate from <i>Klaipėda University</i>, MA Marine Engineering. He is also a regular guest professor in Lithuanian Maritime Academy and a regular pro-active volunteer - a team leader in coastal cleaning campaigns.</p>
<p>Vidmantas PAUKSTE (M) - Infrastructure Director:</p> <p>Vidmantas PAUKSTE is a graduate from Vilnius University and holds a MD in Engineering Geology and Hydrogeology. He is among main decision makers for Klaipėda Port strategic planning, development and expansion. Mr. Paukste has been working in Klaipėda port since 2005 and hold various positions related to infrastructural sector. From March 2019 to June 2020, Mr. Paukste held the position of acting Director General of Klaipėda Port. Vidmantas has extensive experience in various fields such as hydro-technical construction, engineering - spatial panning, environment protection, shipping, port management, EU project management, human resource management.</p>
<p>Algimantas ZUGUS (M) - Head of Information Technology department:</p> <p>Algimantas ZUGUS started his professional career in KSSA since 2001 as a Head of the IT Dept. Ms. Zygyus is in charge digitalisation strategy of the entire Klaipėda Port, IT innovations, Port community systems, software and hardware, IT networks in the port. During 2007-2013 and 2014-2020 Mr Zygyus was responsible for EU port management (INTERREG programme): Trans-Port and Connect2Small Ports. He is also responsible for investment, budgeting, human resource management.</p>
<p>Relevant Projects</p>
<p>INTERREG IV 2007–2013: East-West TC II ; SMOCS ; oversize ; port integration ; supports ; cleanship ; BSR InnoShip ; Mar Tech LNG ; Marriage ;Trans-Governance ; Trans-Port ;Amber Coast Logistics.</p>
<p>INTERREG (BSR) 2014–2020 : Green Cruise Port; EMMA; Connect2Small Ports; Hazard.</p>
<p>ENDURUNS project, H2020, ongoing</p> <p>Development and demonstration of a long-endurance sea surveying autonomous unmanned vehicle with gliding capability powered by hydrogen fuel cell.</p>
<p>Green Cruise Port, ended</p>

<p>The project was dedicated to promote investments to ecological and environmentally friendly infrastructure and suprastructure of the Baltic Sea region cruise seaports.</p>
<p>HAZARD (Mitigating the effects of emergencies in Baltic Sea Region ports), ended</p> <p>The project aimed at mitigating the effects of emergencies in major seaports in the Baltic Sea Region. Main activities of Klaipeda State Seaport were to develop and implement an information system for control of dangerous and polluting cargo.</p>
<p>EAST WEST TRANSPORT CORRIDOR II - a Green Corridor Concept within the Northern Transport Axis Approach, ended</p> <p>The aim of the project was to develop transport hubs, to strengthen the concept of railroads, to improve the network of access roads, to raise qualification of personnel, to develop innovative environment for the "green" corridor. Its long-term goal was to develop East-West Transport Corridor as an effective "green" corridor corresponding to the demands of growing cargo flow transportation.</p>
<p>EMMA (Enhancing freight Mobility and logistics by strengthening inland waterway and river sea transport and proMoting new internAtional shipping services), ended</p> <p>The objective of the project was to enhance the competitiveness of inland water and river transport while decreasing the expenditures per transport unit.</p>
<p>SMOCS - Sustainable Management of Contaminated Sediments in the Baltic Sea, ended</p> <p>The project aim was to establish up-to-date methods for the management of contaminated sediments in order to reduce contamination of the seabed and water, to ensure wider marine biodiversity; to reduce the quantities of hazardous substances in fish and aquatic organisms. These innovations would correspond to the HELCOM action plan for Baltic Sea.</p>

Autonomous Port of Strasbourg	
Description of the organisation	
<p>The Port of Strasbourg, eastern France’s interface with the sea, plays a key role in regional development. It comprises a host of facilities built on the Rhine to the east of the city since the early 20th century. The port is a real catalyst for innovation and fulfils a vital function in the transportation of goods and resources. The Port of Strasbourg enjoys a status that is unique in France. As a public body, it receives the support of local authorities and the French Government for its development, and yet it is financially autonomous, having its own funds to manage its operations and invest in its infrastructures. As a gateway to Europe, Port of Strasbourg is an epicentre for exchanges, growth and interconnection. The Port Autonome de Strasbourg Group comprises three entities: the Port of Strasbourg (Port Autonome de Strasbourg – PAS) is a public establishment created by an Act of Parliament passed on 26 April 1924. The status of the PAS is unique in France: it is managed by a Board of Administration, with prominent roles for the City of Strasbourg and the French State – each has six seats on the Board – plus one seat each for representatives of the Chamber of Commerce and Industry, the administrative Region and the Council for the department, three representatives of the Port of Kehl, three representatives of the staff of the PAS, all in the presence of two State supervisors. Under its constitution, the Chair of the Board of Administration is appointed by the City of Strasbourg; the present Chair is Ms Anne-Marie Jean. Two subsidiaries wholly owned by the PAS: 1/ Rhine Europe Terminals (RET), which is responsible for managing the container and heavy package terminals in Strasbourg and Lauterbourg. RET is the leading operator of container terminals on rivers in France. 2/ Batorama, which operates excursion boats for tourists in Strasbourg. Batorama is the most important paying tourist attraction in the Grand Est region of France, with nearly 800 000 passengers each year.</p>	
Relevant skills/experience/technologies	
<p>The port of Strasbourg is a multimodal cluster designed to boost local development. It operates and manages the docks and proposes a winning combination of products and services. The Port of Strasbourg has gone through a full-blown digital transition. Together with our partners, we have developed new web tools to improve our multimodal services, ensure smoother traffic flows at our various sites and simplify container transport.</p> <p>The Port of Strasbourg is also looking to strengthen its position as a key player in the economy and as a leading port authority while developing best practices. Having long been assigned the role of operator, we are planning to orient our future strategy towards collaboration, innovation and preserving the environment.</p>	
Role in the project	
<p>The Port of Strasbourg will take the role of one of the Fellow ports, focusing mainly on the definition of needs and the practical evaluation of the solutions proposed during the project in the fields of alternative energy production (hydrogen), green mobility, CO2 emissions, air quality and noise pollution.</p> <p>The selected solutions will be implemented in practice, if possible, and verified by the port as part of its daily operations. The adoption of innovative models will help to develop a better understanding of air pollution, noise and CO2 emissions at the port.</p> <p>The objective is to increase the efficiency and resilience of logistics related to the port's activities (operation of container terminals, reach stakers).</p>	

<p>The Port of Strasbourg will also be mobilized to foster partnerships within its port and urban ecosystem around these issues.</p> <p>The Fellow port involvement in WP0, WP2, WP3 and WP7. Details participation are given here above</p> <p>Task 3.5 – PAS Demonstrations</p> <p>Mobility Services: Green logistics, employee mobility, optimization of trucks traffic</p> <p>Green hydrogen production and supply station (s): PAS will carry out the implementation of Hydrogen production/supply station(s). The station(s) will serve for all future hydrogen driven vehicle</p> <p>Environmental Services: GREENING PORTS will monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction.</p> <p>Measurement campaigns will be organised before and after implementation of the Gdynia port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and UAV-based samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM10.</p> <p>Energy Services: we will provide energy simulation of hydrogen workboat navigation in the port area, interaction with the port traffic, optimization of boat energy consumption, simulation of the refueling maneuver and selection of the proper position, of the refueling station, simulation of the communication flows to/from dashboard (WP4).</p>
<p>Key personnel</p>
<p>Emilie GRAVIER (F) - Development and Promotion Director - Port of Strasbourg:</p> <p>Emilie GRAVIER is graduated of Sciences -Po Paris, Emilie Gravier has more than 15 years of experience in the transport area. She dealt with projects like tramway, subway and high-speed line in North Africa, at the French Ministry of Economy and Finances, as support for export and transport equipment.</p> <p>She was the responsible of Ports Strategies and partnerships within the Strasbourg Territorial Directorate of the French Inland Waterways Authority (VNF). Since January 2015, she has been at the head of Port Development and Promotion Department in the Port of Strasbourg. Since July 2018, she is a member of the Supervisory Committee of the Port of Strasbourg' subsidiaries: Rhine Europe Terminals, which is responsible for managing the container terminals of the port, and Batorama, which operates excursion boats for tourists in Strasbourg.</p>
<p>Stéphanie TREGER (F) - Project Manager - Port of Strasbourg:</p> <p>Stéphanie TREGER is graduated in geography and territory development. Master's degree in urban project management. Since 2019, she is a project manager for the port of Strasbourg with focus on: adaptation to climate change, with a particular focus on inland navigation; air quality; and strategic port development and relation between port and the city.</p> <p>Since 2017, she has also been in charge of the animation of "Groupement des Usagers des Ports de Strasbourg", a network of companies based in the ports of Strasbourg.</p>
<p>Manfred RAUSCH (M) - Project manager - Port of Strasbourg:</p> <p>Manfred RAUSCH is graduated in Master degree of project management in social economy. He is born in Kassel, Germany in 1976. Since 2012 project manager for the port of Strasbourg focusing on: international cooperation; innovation (digitization, alternative fuels); and railway interoperability funding.</p>
<p>Relevant Projects</p>
<p>TEN-T project Upper Rhine – a connected corridor, 2012-2014, www.upper-rhine-ports.eu</p>
<p>CEF-project ICT traffic management platform for Upper Rhine ports, 2015-2018, www.upper-rhine-ports.eu</p>
<p>CEF-project LNG Masterplan for the Rhine-Main-Donau, 2013-2015, http://www.lngmasterplan.eu/</p>

CEF-project New Multimodal Terminal of the Port of Strasbourg / Lauterbourg Site, 2014-2018, https://www.strasbourg.port.fr/actualites/a-new-operator-for-lauterbourg-multimodal-terminal-lauterbourg-rhine-terminal/?lang=en
INTERREG project: RPIS 4.0 Port community system for Upper Rhine Ports, 2019-2022, www.upper-rhine-ports.eu
CEF-project LNG Masterplan for the Rhine-Main-Donau (2013-2015) http://www.lngmasterplan.eu/
CEF-project ICT traffic management platform for Upper Rhine ports (2015-2018) www.upper-rhine-ports.eu
CEF-project New Multimodal Terminal of the Port of Strasbourg / Lauterbourg Site (2014-2018) https://www.strasbourg.port.fr/actualites/a-new-operator-for-lauterbourg-multimodal-terminal-lauterbourg-rhine-terminal/?lang=en
INTERREG project: RPIS 4.0 Port community system for Upper Rhine Ports (2019-2022) www.upper-rhine-ports.eu
Relevant publications and products
Services developed by the Port of Strasbourg: 1/ VIGIE to declare your port fees online 2/ Rhine Ports Information System, developed by the Upper Rhine ports, to book loading docks online. http://www.upper-rhine-ports.eu/en/component/content/article/9-page-de-contenu-simple/206-the-interreg-v-a-project-rpis40.html
In 2017, the PAS Group adopted a new strategy for the next ten years, called: PHENIX . https://www.strasbourg.port.fr/wp-content/uploads/2018/06/11_PORT-AUTONOME_WEB.pdf The PAS has two main ambitions: 1 / to be a key player in the port and economic sector 2 / To be exemplary in its practices and its actions. To achieve this, the strategy has five aims: 1/ to develop the power of attraction of the port areas 2/ to develop multimodality 3/ to improve the PAS's performance 4/ to reinforce the integration and place of the port areas in their environment 5/ to make the PAS an innovative, responsible player both internally and in its external actions.
CLES : local environmental synergetic cooperation. https://www.cles-ports-de-strasbourg.eu/ Since July 2013, CLES is a project that works to create new environmental, economic and social dynamics. The latter pursues several ambitions: 1/ Promoting local anchoring, 2/ Strengthen the competitiveness of companies, 3/ Reduce the environmental impact of their activities on the territory. It is a cycle of collective intelligence of the Port of Strasbourg which today represents 122 TONNES OF CO2 EQUIVALENT AVOIDED PER YEAR and €150,000 IN 2019.
Interactive map of Port of Strasbourg : https://www.strasbourg.port.fr/carte-interactive/#/
Learning can be fun : to mark its 90th anniversary, the PAS has brought out an official special edition of the Monopoly board game, licensed by Hasbro Gaming.
Infrastructures
The convergence of European trade routes and the concentration of transport infrastructures make the Port of Strasbourg a strategic multimodal platform. This leading hub is ideally located for imports and exports via the major North Sea ports, and the distribution of merchandise throughout Europe. The multimodal area of the Port of Strasbourg constitutes an inland maritime range. Its central position makes it a preferred transit site for handling heavy lifts.

Key figures: 3 Containercontainer terminals : Strasbourg north and South / R3FLEX& south/Reflex in Lauterbourg; 4 Portport sites : Strasbourg / /Lauterbourg / Marcokolsheim / /Marckolsheim/Beinheim, 100 km of river front ; 100 km of rail ; 8,000,000 tonnes per year and 16 reach stackers.

For more details about multimodal transport CONTAINERS :


<https://www.strasbourg.port.fr/wp-content/uploads/2018/11/BAT-Fiche-PAS-conteneur-en-ok.pdf>

For more details about multimodal transport BULK :

<https://www.strasbourg.port.fr/wp-content/uploads/2018/11/Fiche-PAS-vrac-en-ok.pdf>

For more details about multimodal transport HEAVY LIFTS :

<https://www.strasbourg.port.fr/wp-content/uploads/2018/11/BAT-Fiche-PAS-colis-lourds-en-ok.pdf>

EUROGATE CONTAINER TERMINAL LIMASSOL LTD	
Description of the organisation	
<p>The EUROGATE Group was established in September 1999 in the course of the merge of the container activities of BLG Logistics Group and the container activities of EUROKAI GmbH. The principals of EUROGATE have been involved in port operations in Germany since 1865. The company's headquarters are located in Bremen. Across the world Eurogate employs over 8.000 employees. EUROGATE, together with its Italian subsidiary Contship Italia S.p.A is active at 10 terminal locations in Germany, Italy, Portugal, Morocco, Russia and now Cyprus. With a total throughput of more than 11.0 mil TEUs in 2019, the EUROGATE Group is the leading independent container terminal operator in Europe.</p> <p>Eurogate Limassol Container Terminal CTL is the main commercial port of the Republic of Cyprus and currently has an annual handling capacity of 500,000 TEUs which is expected to increase to about 1.0 million TEUs in the future.</p> <p>CTL has invested in the modernisation of the container terminal, especially in large-scale equipment, medium size yard equipment and in site remediation. More specifically, the company has purchased two New STS cranes and will have ready for operation at least four cranes with an outreach of 18 and 23 rows. The company has already completed its investments in the Terminal IT-system and has invested in 16 second-Hand Straddle Carriers in order to support operations and several other in site works. Additionally, CTL has invested in upgrading the infrastructures of the Terminal including upgrading lighting and extensive road works. CTL offers commercial services of Vessel operations (Discharging / Loading), Truck Operations (Loading / Unloading), Storage (as a Customs Approved Economic Operator) for Dry Cargo, Dangerous Goods, Reefers and Empty Containers, as well as Reefer Services (Power supply and plugging / unplugging and monitoring). CTL has also invested heavily in the digitization of systems and processes, where 100% of cargo operations logistics are handled through our Eurogate Groups' in-house software systems.</p>	
Relevant skills/experience/technologies	
<p>CTL draws experience not only from the Eurogate Group but also from its' staff who collectively have immense experience in the commercial shipping sector, logistics both sea and land side, electrical and mechanical engineering as well as heavy equipment programming, Port Community Systems (Single Window) integration, logistics data exchange, and environmental design and monitoring.</p> <p>Collaborative systems developed by CTL or with collaboration with other entities include automatic release of cargo through customs clearance (paperless), monitoring of ADR and licenses of trucks and trailers in direct collaboration with the Road Transport Department, environmental air quality monitoring, and monitoring of dangerous goods within the Terminal.</p> <p>Current technologies of CTL include an extensive fiber optic network offering connectivity with all points of the terminal, advanced remote monitoring systems for crane performance and diagnostics, automatic plate recognition of trucks and trailers - offering connectivity with competent authorities.</p>	
Role in the project	
<p>CTL being the main commercial terminal for consumer cargo in the island, has a deep understanding of logistics operations and solid connections with both the shipping lines, shipping agents, as well as the land transportation entities and all relevant Competent Authorities, including the Deputy Ministry of Shipping, the Department of Environment, the Road Transport Department. CTL being a main logistics chain</p>	

connecting point, can help bridge the gap between ship, truck and competent authorities and optimize the logistics chain, reducing delays and waiting times for both ends of the chain. CTL, having a heavy investment in technology and power usage but at the same time remaining and small and versatile Terminal, can quickly implement, test and report on the efficiency of new technologies including environmental monitoring and energy reduction. At the same time, being a relatively new Terminal, CTL maintains a high potential for improvement and installation of new projects, especially in the energy sector.

The Fellow port involvement in WP0, WP2, WP3 and WP7. Details participation are given here above

3.6.1 Logistics Services: (CTL, WST)

Green logistics demonstration on shipping side and on port operation side. The service is based on integrated simulator environment to evaluate efficient way of execution ship voyage, port approach and port resources utilization, with minimized fuel consumption, reducing anchorage waiting time, optimizes approach manoeuvres.

3.6.2 Environmental Services (M9-M48) (CTL CyI, CNRS)

Monitor and map air pollution and GHG emissions with techniques presented and developed in WP 2.6.3, 4 and 5 to quantify expected emission reduction. Measurement campaigns will be organised before and after implementation of the Limassol port case. They will be based on fixed recurrent samplings, precise punctual samplings, application of lidar techniques and UAV-based samplings. These campaigns will allow concentration mappings of air pollution, GHG, and PM10.

Key personnel

George POURROS (M) - Chief Operations Officer:

George POURROS has extensive port and maritime operations experience, starting from a 20 year experience as a Captain onboard commercial vessels, including container ships and tankers, assuming the position of a Senior Pilot and then Port Manager of the Limassol Port under the umbrella of the Port Authority, and then switching to the private sector once again, coordinating the design, setup and operation of Eurogate Container Terminal Limassol in 2017.

Petros DIAS (M) - Health Safety Security Environment and Port Facility Security Officer:

Petros Dias duties include Environmental monitoring and pollution prevention as well as maintaining the ISO14001 procedures of the company and designing future environmental policy. Mr Dias has previously served as the Environmental Officer of the Cyprus Ports Authority, designing and implementing the Port Authority Environmental Policy at a national level. Additionally, Mr Dias has been involved in three European funded projects, all in the scope of Environmental protection, twice serving as the Project Manager for the Authority and once as the Coordinator for the project.

Ioannis TSIELEPIS (M) - Head of The Electrical Department of Eurogate Container Terminal Limassol:

Ioannis TSIELEPIS started his employment at Eurogate CTL as High Voltage Engineer in 2018 with his first project being the upgrade of the main 11kV Substation to accommodate the new Super Post Panamax STS Cranes. In 2020 with his team they completed the upgrade of the terminal yard lighting system from HPS Flood 1000W to LED technology Flood lights reducing the required power to less than 70% compared to HPS Flood lights, while improving the lighting profile of the

Terminal. Prior to his employment in Eurogate CTL, Mr Tsielepis was working as an electrical Engineer in Desalination plant in Cyprus with a maximum production of 60000m ³ /day.
<p>Alessandro CASSERA (M) - Electrical Engineer of the Technical Department:</p> <p>Alessandro CASSERA duties include the planning of maintenance and repair activities to maintain a high availability of the Terminals' assets, as well as providing technical support in the field of Industrial Automation and Electrical Drive Systems to the staff in order to achieve those goals. He has been involved in revamping projects of Ship to Shore cranes at the port in regards to the automation system. Previously he has served as an Electrical Engineer in designing, planning and installing the construction of <150KWp Photovoltaic systems and their tracking automation systems as well as their maintenance.</p>
<p>George PAPAS (M) - Operations Process Manager:</p> <p>George Papas has more than 24 years of results-focused experience involving all aspects of shipping, Container Terminal Operations, Customs procedures, Agency Management, Vessel chartering, IT, logistics, transportation, project coordination and management. Mr Papas has worked with Shoham (Cyprus) Ltd for over 20 years, gaining deep understanding of shipping operations involving the entire supply chain, from the shipper to the shipping line, vessel operations, port operations, customs clearance and even land transportation until the final delivery.</p> <p>Mr Papas is the responsible person at Eurogate since 2017 for overseeing all logistics and clearance systems operations as well as designing and optimizing the software processes supporting all logistics operations.</p>
Relevant Projects
The company is relatively newly formed. As such, no such European projects have been assumed so far
Relevant publications and products
Unloading containers from vessels
Safe storage and handling of conventional containers and powering of reefer containers
Delivery of stored containers
Collaborations with Competent authorities for cargo clearance
Eurogate Container Terminal Limassol Cyprus offers container vessel services, covering the logistics cycle from vessel container unloading, storage and powering (for reefers), handling and delivery and vice versa. You can see our full services in our website: Eurogate Limassol
Infrastructures
Terminal High Voltage network 5x Ship to Shore Gantry Cranes Extensive LED lighting network (covering appx 0.8 sq km) Eurogate terminal cargo management software system – TOPX and COIN Complete fiber optic network Terminal area, buildings, offices Total of 35 moving lifting equipment

The Cyprus Institute	  THE CYPRUS INSTITUTE RESEARCH • TECHNOLOGY • INNOVATION EMME-CARE EASTERN MEDITERRANEAN MIDDLE EAST - CLIMATE & ATMOSPHERE RESEARCH CENTRE
Description of the organisation	
<p>The Cyprus Institute (CyI, www.cyi.ac.cy) is a world-class research and technology institution, carrying out pioneering research programs involving cutting-edge high throughput technologies, in order to address regional problems of global significance. It consists of 4 research Centres that address challenging problems both at the regional and international levels. The novelty of the Institute derives from its structure that consists of issue-oriented, rather than discipline-oriented research centres, in an interdisciplinary environment.</p> <p>The Climate and Atmosphere Research Centre (CARE-C) is the fourth research centre of the CyI, established under the framework of the European Commission Horizon-2020-WIDESPREAD-TEAMING project “EMME-CARE” (Eastern Mediterranean and Middle East Climate and Atmosphere Research Centre; Grant no. 856612; http://emme-care.cyi.ac.cy), and the Cyprus Government. CARE-C currently holds 100 research staff (of 15 different nationalities), aiming to become a regional knowledge hub for Air Pollution and Climate Change research, working towards sustainable solutions, addressing societal challenges of Cyprus and the Eastern Mediterranean and the Middle East region.</p>	
Relevant skills/experience/technologies	
<p>The main research topics addressed in CARE-C concern the characterization of natural/anthropogenic atmospheric emissions (concentrations, properties, spatial/temporal distribution), the description of their atmospheric fate (photochemical transformation), and their impact on climate ((in)direct radiative forcing) and air quality (regulation and health).</p> <p>Through its Environmental Observation Department, CARE-C has strong expertise in the monitoring of air pollutants (reactive gases, greenhouse gases, aerosols) through continuous long-term observations at the Cyprus Atmospheric Observatory (see later Section 3.5 Research Infrastructure) and intensive field experiments in Cyprus and abroad (mostly in Europe and the Middle East) within harsh environments. This expertise covers ground-based remote sensing techniques (LIDAR) and in-situ techniques using a wide variety of on-line and off-line sampling and analytical techniques ranging from filter sampling (for aerosol chemical speciation) to state-of-the-art real-time Mass Spectrometers.</p> <p>Through its Research Infrastructure Unit, CARE-C has strong expertise in the development, qualification, validation (/calibration), and field demonstration of low-cost miniaturized air quality sensors and UAV-sensor systems for profiling of gases/aerosols in the first kilometres of the atmosphere. These research activities are supported by two Facilities of CARE-C; the Instrumentation Nano-Lab and the Unmanned System Research Laboratory (USRL) (See later Section 3.5 Research Infrastructure).</p>	
Role in the project	
<p>The Cyprus Institute will contribute to the Environmental Monitoring Activities through : the test/validation of a large number of robust low-cost atmospheric sensors for real-time monitoring Air Pollutants relevant to Port emissions (fossil fuel combustion) such as Electro-Chemical ones (CO, NO, NO₂), Ultra-Fine Particles / Black Carbon with a new generation of sensors. The design, establishment, and operation of an optimal dense AQ network in selected ports for periods >1 year and development of a near-real-time data transfer/visualization platform for stakeholder and public information. The real-time mapping of combustion emissions in selected Ports using a synergistic approach with novel remote sensing technique</p>	

(360° horizontal scanning LIDAR) with a coverage of 3-5km radius and in-situ calibration of PM and co-emitted species (CO₂, CO, NO_x) using mobile technique such as Unmanned Aerial Vehicle for stack emissions.

This large dataset will be used to investigate : the compliance of the Port(s) to EU directives related to Air Quality (NO₂, CO, PM) and Sulphur emissions from the shipping sector. The contribution of Port emissions on local Air Quality versus regional contribution using the so-called experimental “Lenschow approach”. The efficiency of various mitigation measurements on air pollutant emissions through direct observations (LIDAR scanning) and long-term monitoring (AQ network), and the development of new Environmental monitoring services/products.

Task 2.6 - Environmental Services; A comprehensive suite of technological solutions (TRL>6) will be further adapted/combined here (Task2.6) and deployed in lighthouse/fellow ports (WP3) in order to assess (in WP4) the positive environmental impacts of (energy/mobility) mitigations measures.

Key personnel

Jean SCIARE (M) – Primarily responsible researcher:

Jean SCIARE holds a tenured Professorship in Atmospheric Sciences at the Cyprus Institute since 2015 and is director of CARE-C. He has more than 25 years of experience in atmospheric chemistry, focusing on the various impacts of air pollutants (climate, air quality, health, global security). He has been leading a large number of French research projects (IPEV, ANR, ADEME, CNRS, CEA, PRIMEQUAL) and participated in many EU projects; former FP (FP5, FP6, FP7), new ESA and H2020 projects (ACTRIS2, ACTRIS PPP, ACTRIS IMP, ATMO-ACCESS, CoCO₂) and leading (as project coordinator) the EU flagship (30M€) teaming project „EMME-CARE“. JS has performed field campaigns in contrasted environments (North/South Pole, Amazonian forest, megacities in Africa, Asia, and Europe, oceanographic cruises, aircraft). J. Sciare is the Head manager of several CyI-CARE-C Facilities relevant to the call (CAO, USRL, ECL). He is (co-) author of c.a. 150 international refereed publications in atmospheric chemistry and physics. He received his Habilitation in 2009 and has supervised >15 Ph-D students and post-docs. (h-index>40; Scopus; citation ~4,500)

CV available at: https://www.cyi.ac.cy/images/rescvpdf/Jean_Sciare-CyI_CV.pdf.

George BISKOS (M) – Associate Professor:

George BISKOS holds a tenured Associate Professor position at the Cyprus Institute since 2014. He is an Environmental Scientist and Engineer by training with a PhD degree on Aerosol Instrumentation, and a specialization on the hygroscopicity of atmospheric particles that was obtained during his postdoctoral research at Harvard University. Since 2008 that his professional career as a faculty member started, he has worked in three main fields of Aerosol Science and Technology, i.e., Atmospheric Aerosols, Aerosol Instrumentation and Aerosolbased Nanotechnology, providing him with a highly multidisciplinary background. Currently Prof. Biskos is leading a group of 10 young researchers (Engineers, PhDs, Post-docs) in the field of Aerosol Instrumentation (miniaturized sensors) and Nanotechnology. To date Dr. Biskos has authored/co-authored 60 scientific papers in refereed journals (h-index > 16; citations > 1,500). His publications fall in three main subfields of aerosols science and technology: 1. atmospheric aerosols, 2. aerosol instrumentation, and 3. aerosol-based nanotechnology.

Relevant Projects

Partner of JPI MARTERA “MATE” (MARitime Traffic Emissions: A monitoring network ; 2020-2023). Total Funding: 2.2 million euros. CyI contribution: Monitoring of ship air pollutant emissions using UAV-sensor technology in selected EU ports (CyI-USRL facility).

Coordinator of H2020 “EMME-CARE” (2019-2026; total Funding: 30 million euros from EC and Cyprus Government; GA #856612; https://emme-care.cyi.ac.cy/). Eastern Mediterranean and Middle East Climate and Atmosphere Research centre CyI contribution: Establishment of a new (regional) centre of excellence on Air Pollution and Climate Change.
Coordinator of Cyprus Research and Innovation Foundation “AQ-SERVE” (2018-2021; total Funding: 1.2 million euros; RIF INTEGRATED/0916/0016; https://aqserve-project.com/). Air Quality Services for a Cleaner Air in Cyprus. CyI contribution: Coordination and development of national atmospheric research infrastructure and air quality products and services (miniaturized sensors, air quality forecast, impact assessment).
Partner of H2020 “ACTRIS IMP” (2020-2023, GA# 871115; http://actris.net/). CyI Funding: 110 thousand euros CyI contribution: Implementation of the EU Research Infrastructure ACTRIS (Aerosols, Clouds, and Trace Gases) and provision of innovative transnational access (CyI-USRL facility).
Coordinator of ESA “META-SAT” (2018-2020; CyI Funding: 170 thousand euros; https://www.cyi.ac.cy/index.php/care-c/research-information/ongoing-projects/meta-sat-modeling-of-emissions-trends-and-air-quality-using-satellite-measurements.html). Modelling of Emissions, Trends and Air quality, using SATellite measurements. CyI contribution: Coordination and Satellite based Air Quality data over the EMME for better mitigation and adaptation.
Relevant publications and products
Pikridas, M., Bezantakos, S., Močnik, ..., and Sciare, J.: On-flight intercomparison of three miniature aerosol absorption sensors using Unmanned Aerial Systems (UAS), <i>Atmos. Meas. Tech.</i> , 12, 6425–6447, https://doi.org/10.5194/amt-12-6425-2019 , 2019
2. Zhang, Y., Favez, O., Petit, J.-E., Canonaco, F., Truong, F., Bonnaire, N., Crenn, V., Amodeo, T., Prévôt, A. S. H., Sciare, J., Gros, V., and Albinet, A.: Six-year source apportionment of submicron organic aerosols from near-continuous measurements at SIRTa (Paris area, France), <i>Atmos. Chem. Phys.</i> , 19, 14755–14776, https://doi.org/10.5194/acp-19-14755-2019 , 2019
Mamali, D., Marinou, E., Sciare, J., Pikridas, M., Kokkalis, P., Kottas, M., Binietoglou, I., Tsekeri, A., Keleshis, C., Engelmann, R., Baars, H., Ansmann, A., Amiridis, V., Russchenberg, H., and Biskos, G.: Vertical profiles of aerosol mass concentration derived by unmanned airborne in situ and remote sensing instruments during dust events, <i>Atmos. Meas. Tech.</i> , 11, 2897-2910, https://doi.org/10.5194/amt-11-2897-2018 , 2018
Infrastructures
The Cyprus Atmospheric Observatory (CAO, https://cao.cyi.ac.cy/) of CARE-C. CARE-C has expertise in operating the Cyprus Atmospheric Observatory which provides quality controlled long-term atmospheric observations of key atmospheric pollutants (gases/aerosols) relevant to climate change and air quality. CAO, labelled as a “national facility” for Cyprus, has been integrated into the European Research Infrastructure “ACTRIS” and several other major international networks (EMEP (European Monitoring and Evaluation Programme; www.emep.int/); WMO-GAW (World Meteorological Organization – Global Atmospheric Watch; http://public.wmo.int/en/programmes/global-atmosphere-watch-programme); AERONET (Aerosol Robotic Network; http://aeronet.gsfc.nasa.gov/).
The CYL Unmanned System Research Laboratory (USRL; https://usrl.cyi.ac.cy/) of CARE-C USRL is currently the only research infrastructure operating UAV-based atmospheric research in the EMME region, one of the few world-wide. Its recent technical developments on miniaturized atmospheric sensors and the development of an unparalleled (multi-purpose) fleet of research aircrafts are major components of

several on-going EU projects (FP7-BACCHUS, H2020-ACTRIS2, H2020-ACTRIS-PPP, H2020-ATMO-ACCESS, ESA-ASKOS). They have been highlighted in recent scientific papers; providing the first ever UAV-based vertical profiles of Ice Nuclei particles (Schrod et al., 2016) and black carbon concentrations over a dense populated area (Pikridas et al., 2017).

USRL Infrastructure includes 1) An instrumentation lab (50m²) with weather chamber; 2) Specialized mechanic/electronic workshops (100m²); 3) A private (asphalt) UAV airfield and permanent private airspace (up to 4km altitude) located at 30km west of Nicosia; 4) A team of 8 experienced engineers (electric, electronic, software, system, communication, mechanic/material), 2 professional pilots.

USRL Instrumentation includes 1) Large fleet of Unmanned Aerial Vehicles (fixed and rotary wings) with different payload capacity (up to 10kg); 2) UAV-balloon systems for high altitude profile (up to 10km); 3) A large set of lightweight atmospheric sensors relevant to ACTRIS and ICOS/INGOS; 4) Capacity to design, develop and test atmospheric sensors in collaboration with the private sector and/or other academic partners.

USRL added values are 1) co-location of the Cyprus Atmospheric Observatory (CAO), another ATMO-ACCESS TNA, 2) new infrastructure, 3) experienced technical staff, 4) size/diversity of the UAV fleet, and 4) a wide range of available atmospheric sensors, and 5) customized sensor development and integration (hardware/software). Services currently offered by the infrastructure: Access to a unique atmospheric environment (Cyprus) impacted by long-range transported (EU) and Middle East pollution, desert dust (Africa, Arabian Peninsula). Development of customized UAVs for flying lightweight sensors (innovation potential). Test/Qualification/Validation of lightweight instrumentation testing in weather chamber (complementary to services provided by ACTRIS CFs). Quality training of UAV end-users (safety, good practices, SOPs related to sensor integration). International field campaign deployment (Research projects).

Instrumentation Nano-Laboratory of CARE-C.

By integrating expertise in electronics engineering, material science, fluid dynamics and information technology, recent advances at the instrumentation lab have led to new possibilities in the development of miniaturized, lightweight and cost-effective instruments for measuring aerosol particles and gaseous pollutants.

Novel manufacturing methods (e.g., using mold casting and 3D printing) are already employed by members of the Instrumentation laboratory for building integrated instruments for measuring the concentration and size of atmospheric aerosol particles and gas sensors. Such instruments are expected to lead the way into widespread use in ground and airborne monitoring using platforms such as balloons, UAVs, and combinations of the two. A weather simulation chamber has been built to test miniaturized sensors in real-world conditions (UAV flights in the upper troposphere).

The Instrumentation Laboratory's activities are expanded to include the development of miniaturised gas sensors, as well as integrated air quality instrumentation for ground-based in-situ measurements, and for remote sensing instruments

**Description of the organisation**

The University of Genoa (UNIGE) was founded in 1933 by means of Regio Decreto n. 1592 but its history can be traced back several centuries (14th century). The University is nowadays a teaching and research institution organized in 22 departments within 5 schools, 13 interuniversity research centers and 2 centers of excellence. Its educational offer is composed of 124 Bachelor and Master courses, 28 PhD courses divided into 92 curricula, 53 specialization schools, 27 I and II level University Masters, 5 Libraries.

UNIGE is a public institution provided with scientific, educational, organizational and financial autonomy, in which academics, students, administrative and technical staff participate in the construction of a European area for research and advanced professional training.

UNIGE has a synergic collaboration with many national research organizations, innovative SMEs and industries which are located in Liguria and operate worldwide, such as the Italian Institute of Technology (IIT), the Consiglio Nazionale delle Ricerche (CNR), the Istituto Nazionale di Fisica Nucleare (INFN), RINA Consulting among others, thus making Genoa very attractive for the brightest researchers in a variety of scientific disciplines.

Discoveries, inventions, advances achieved by research activities are successfully commercialized, with 81 patent applications, 45 spin-off and a strong involvement in startup creation, with a specific business plan competition.

The University of Genoa has a strong participation both in EC Framework and in other important European and international research and cooperation programmes. In particular, within FP6 UNIGE was awarded 92 project, in FP7 115 contracts and, up to now, 76 Horizon 2020 contracts.

The complete list of projects is available at the following link: https://unige.it/ricerca/prog_euint

The strong participation in these programmes is supported by a well-coordinated administrative network, where different offices (at central and department level) work in synergy in order to support researchers during all phases of a project, from the submission to the financial management other than intellectual property and technology transfer assistance.

The “Open Science@Unige” initiative (<http://openscience.unige.it/>) is the fruit of collaboration between the University Library System and the Research Office of University of Genoa. Created to spread Open Access through the IRIS UNIGE institutional archive, this synergy has been extended to the enhancement of all aspects of Open Science in research projects by organising workshops and courses on the different aspects of OS, helping researchers in the development of Data Management Plans and supporting the implementation of Open Access principles. Moreover, Unige subscribed Transformative Agreements with some of the mayor editors (Cambridge UP, Springer, DeGruyter, ACS, etc), that allow its authors to publish in Open Access on many hybrid journals without paying fees.

Unige organizes regularly training courses and events aimed at widening the competences of the researchers beyond the scientific skills (e.g. project proposal writing, open science, project management etc.). IPR and exploitation –The Technology Transfer Office supports researcher in the valorization of research results, gives advice for the protection and enhancement of university research results, and supports researchers in patent applications and protection of copyright and software. UNIGE’s Communication and Events Office helps researcher in communicating research activities to the wider public through press, social media and local media (radio, TV).

The Department of Naval Architecture, Electrical, Electronic and Telecommunication Engineering (DITEN) includes a broad range of engineering expertise, including about 60 academics and 25 technicians and administrative.

The Telecommunication group within the department is composed of a staff of 13 Professors that cover most of the telecommunication fields starting from Networks Technologies (Wireless, Wired Networks, Internet Technologies, Cybersecurity, Radio mobile 5G, Internet of things) up to Signal Processing topics (for medical, territory control (satellite images), security purposes, among others). The group manages different laboratories with many instrumentations and testbeds of the most recent technologies (e.g., 5G).

The Electrical group have significant experiences in the research areas concerning management, optimization, protection and control of electrical systems and networks, smart grids, smart metering, real time monitoring and intelligent load management for energy consumption, rationalization in districts with aggregation of users, and distributed generation from renewable (wind, photovoltaic, etc.).

Shipboard power systems protection and control, and their integration within the land distribution microgrids have been covered by several publications. Fuel cell and battery energy storage system applications represent today one of the group main research areas, in the context of zero-local emission and multi-energy infrastructures.

The Unige group is also composed by the Italian Centre of Excellence in Logistics, Transport, and Infrastructure (CIELI), a centre funded in 2003 thanks to the support of a specific Italian Ministry funding. CIELI's mission is applying scientific research and advanced training to the logistics and transport sector, integrating its different thematic areas (shipping, land transport, air transport, supply chain, industrial logistics, distributive logistics, security, ICT for future logistics and transport security, etc.).

Moreover, CIELI enhances qualified skills in the field of logistics and transport thanks to the joint contribution of lecturers and researchers from the University of Genoa's Social Sciences School (i.e., Law and Economics) and the Polytechnic School (e.g., Transport Engineering, TLC, Electrical research group), providing an organizational platform that help Unige's researchers to cooperate in multidisciplinary projects: as such, interdisciplinarity is a value and a distinctive factor and strength of the Centre. Currently, the centre hosts a dedicated PhD programme, more than 55 academics and it is involved in several national and European research projects (e.g. H2020, CEF funding scheme, Interreg).

Institutional research is a fundamental objective for CIELI: moreover, CIELI aims to be a meeting point between the academic and business world by putting in place research and training projects based on the demands of the business world and institutions in order to create concrete and measurable impacts on the productive fabric.

With consistently high-quality scientific production, CIELI aims to establish itself successfully in the national and international panorama as a point of reference for research and training in the field of logistics and transport thus becoming a key partner for institutions and business.

The Department of Law (DDG) has more than 60 academic staff, including full professors, associate professors and researchers, a significant number of which, belonging to the Genoa Institute of International, European and Maritime Law (<http://www.genoainstitute.eu>) are heavily involved in teaching, research and publication in the fields of maritime law, law of the sea, international and European environmental law. Additional expertise exists, with particular regard to ports, in the area of administrative law.

The University of Genoa recently opened a new centre of excellence where all subjects related to Marine and Maritime have been included. The aim of the centre (Centro del Mare) is to coordinate scientific research and teaching activities. The centre of excellence includes 5 bachelor's degrees and 8 master's degrees in

architecture, Economics, Engineering and Science. The centre of excellence also includes the PhD in Marine Sciences and Technology with the following branches: Logistics and transport, Science of the marine ecosystem, Marine and Nautical Design, Energy machinery and systems for the sea, Engineering for Marine and Coastal Environments, Marine and Nautical Engineering / Marine technologies. About 400 researchers/professors are involved in the above related activities.

Relevant skills/experience/technologies

The centre of excellence on Marine and Maritime Study (Centro del Mare) gathers the expertise of about 400 staff researchers/professors belonging to the University of Genoa. Among all, the following expertise are considered of particular relevance for the present call. Logistics and maritime economics included into CIELI centre of excellence. Maritime laws and legislation included into DDG (Law Department). Management, optimization and control of electrical networks, smart grids, smart metering, real time monitoring and intelligent load management for energy consumption, included into DITEN Department. Smart communication technologies included into DITEN Department. Ship design, ship simulation and through life system design included into DITEN Department.

Role in the project

The Naval Architecture and Marine Engineering branch is involved for computer simulation of ship and marine systems exhaust emissions, waterborne emissions and airborne emissions as well as for the port authority green fleet design. The marine mechatronics lab is involved for drone technology in remote survey. The electrical competence at DITEN can provide support in energy modelling, microgrid design and renewable integration with electrical storage and multi energy hub concept deployment.

The telecommunication group of DITEN will help identify and design the ICT platform for supporting the ports green evolution considering technologies like the 5G, IoT, cloud, and edge computing. A specific effort will be used to find low consumption technologies and ensure appropriate performance (e.g., latency, bandwidth, reliability) to the different involved services.

CIELI will provide a variety of skills encompassing logistics, transport engineering, economics, finance, and internal law. This wide contribution will be delivered through the aggregation of the different competences coming from relevant academics within CIELI and the organisation of such contribution in several thematic sub-groups that will focus on the specific tasks (e.g. logistics service provision, financial KPI, blockchain assessment, economic framework) that will be delivered within the project.

The staff based at the Department of Law will contribute to the project, on the basis of the expertise of its academic staff, with the analysis of the relevant legal framework (at the international, European and domestic level) and the issuance of appropriate recommendations

Task 2.2 - Green Smart Logistics; this task will focus on the provision of services related to smart logistics operations and the analysis of their impacts in terms of internal port logistics organisation and related KPIs. The preliminary activity of the task will be the evaluation of key operational, social, and economic aspects that will be impacted by the introduction of smart logistics operations ; this activity, led by Unige, is considered preparatory for the introduction of smart logistics services and it consists in mapping the internal port processes that will be later optimised. After this, the task will be centred around **3 key pillars**. Each pillar capable of reducing the environmental footprint of port operations at current status quo in terms of deployed hard-technologies and infrastructure).

2.2.1 Simulation and optimisation of port logistics operations. In the first pillar, a set of models and tools are defined and developed for the planning of port logistics operations and for the daily management of port logistics operations. The models and tools for planning, in which the target is to determine the configuration of the logistics activities and the sizing and nominal allocation of resources (also in terms of technological equipment) in the various zones of the port, will be developed by CapGemini, whereas the models and tools

for daily management, in which the target is to schedule the operations that are carried out in the various zones of the port taking into account the actual availability of resources, will be developed by Unige (for the gate-to-yard and yard-to-quay areas) in collaboration with Sinay (for quays and berth management). The two classes of models and tools will be connected to the DSS for port logistics operations that gets data from various systems and devices, allows defining/selecting “green smart logistics” strategies and procedures, and computes and reports the relevant KPIs. Such tool will be developed by Unige in cooperation with Capgemini and Sinay. In order to achieve the planned TRL (level 7), the tool will be tested in Gdynia (the lighthouse port) and in one of the fellow ports.

2.2.2 Impact of smart contracts in the smart logistics definition. The second pillar investigates how the introduction of smart contracts will impact the different port operations and also provides a set of guidelines for the implementation of such technology with an assessment of relevant opportunities and constraints in a legal perspective, in connection with the port cases. Both activities will be carried out by Unige.

2.2.3 Smart business models and operational impact of the application of novel technologies. Finally, in the third pillar, a Technology Acceptance Model will be implemented by Unige in collaboration with CERTH, in order to better understand the actual effect on daily operations that the new technologies will generate.

Task 2.3 - Seamless and efficient logistic operation; this task will aim at defining and developing models, solutions, and tools for smoothening the in- and out- port multi-modal traffic. A first part of the task will be dedicated to understanding port-city relations and relevant transport and logistics networks, in order to assess generalised costs, challenges, and advantages of different solutions. Similarly, an assessment of key traffic flows and stakeholders will be performed, in order to plan a smooth future implementation of the proposed solutions and to evaluate operational and economic impacts of the technology implementation. After having concluded these preliminary assessments, a set of macroscopic and microscopic traffic models and tools are defined and developed for the analysis of infrastructural connections (roads, rails, and waterways) to and from the port. In the macroscopic models and tools, the target is to analyse the traffic flows that come from the port or are directed to the port with the aim of studying the impact of these flows on the mobility of a wide area including cities, towns, other logistics terminals surrounding the port; in this context, multimodal and synchromodal strategies can be defined and analysed (among others) with the objective of reducing the impact of freight traffic. These models and tools will be developed by CapGemini in cooperation with Factual. In the microscopic models and tools, the target is to analyse the activities at the gates of the port; in this context, strategies for regulating the freight flows at the gates are defined, developed, and applied in order to reduce the impact of freight traffic on the area outside the port. These models and tools will be developed by Unige in cooperation with Factual. In this task, solutions provided by other tasks (e.g., digitalisation of documents, presence of smart parkings, innovative mobility services, etc.) are also taken into consideration. The two classes of traffic models and tools will be connected to the DSS for port traffic flows (D.2.3.5) that gets data from various systems and devices, allows defining/selecting strategies and procedures for port traffic flows management (e.g., synchromodality), and computes and reports the relevant KPIs. Such smart tool will be developed by CapGemini in cooperation with Unige. In order to achieve the planned TRL (level 7), the tool will be tested in Gdynia (the lighthouse port) and in and in one of the fellow ports.

Task 2.5 - Green ports energy simulations; this task will address two main challenges, the continuous energy optimization of port activities (shore and waterborne), with particular reference to the port demonstration cases, and the evaluation of the long term effectiveness of the proposed demonstrations.

Task 2.5.1. The simulation activity has the aim to highlight and prove the effectiveness of the port demonstrations to minimise energy consumption with particular reference to ships/boats traffic scheduling and routing, shore based users and ship-shore connection. Energy flows will be used to simulate the appropriate environmental KPIs.

UNIGE will develop and simulate the multi-energy hub approach to be demonstrated in Gdynia and Strasbourg, using steady state load flow modeling as well as quasi-dynamic electric modeling for storage and time-varying components.

UNIGE and Wartsila will simulate the ship/boat related energy flows. The ship simulations will run in combination with OnAir vessel-specific routing technology based on existing SmartNautilus application. A dynamic conflict detection and resolution layer will be realized in order to provide each vessel with a feasible schedule/routing plan, expressed by a set of space/time constraints, allowing both minimization of energy consumption/CO2 emissions and schedule/routing feasibility at the same time. The better optimal schedule of all vessels become suddenly suboptimal (or even unfeasible) with time-changing conditions (traffic congestion, late arrivals, resource unavailability, modified meteo forecasts, etc.). So it is necessary to realize a continuous dynamic rescheduling in order to quickly adapt the planning to a modified scenario. In this sense optimization algorithms will be adapted in order to allow a continuous updating of the global solution, keeping into account the available computational resources.

CAPGEMINI DEMS will develop all the connectors to retrieve in service data from the various energy consumers (shore vehicles, ships, buildings, etc.) and identify the energy optimizations per consumers/categories/sites, by using ENERGISME platform and functionalities.

DNV-GL will assure the engineering relevance of the simulations results by the adoption of appropriate standards.

The output of these activities will be twofold: a continuous energy management based on a complete picture of main energy sources and main energy sinks in the port area, a DSS able to manage the port waterborne traffic in real time achieving the minimum overall energy consumption.

Task 2.5.2. A resilient solution is a technical choice able to maintain the desired performance in the long term, irrespective of the mutating surrounding environment. Availability and Supportability Analysis is intended to facilitate decision-making on the best approaches for maximizing resilience and minimizing through life costs.

UNIGE will develop Availability & Maintainability simulations in order to support the sustainability of the green port solutions in the long term. The Operational Availability will be used as KPI for some selected key green port infrastructures.

Task 2.7 – Green ICT Architecture for Ports; this task's main general objective is to design the ICT reference architecture for supporting the port evolution towards increased environmental compatibility and a higher level of efficiency and effectiveness. This architecture includes wired and wireless networking facilities, Internet of Things (IoT) support, and, more in general, the sensors and actuators management infrastructure, the computational infrastructure (including cloud, Machine to Machine, and edge computing approaches), and the cybersecurity management structure. Current high-performance ICT platforms tend to absorb a large quantity of energy. For these reasons, this task will design its ICT architecture by minimizing consumption and integrating renewable energy sources in the system to obtain an actual green ICT architecture.

Task 2.7.1. Monitoring architecture - One of the critical roles is given by the collection of detailed info about the behavior of ports in neighboring areas (both sea and land sides) concerning both checking the environmental behavior and for supporting the efficiency and effectiveness of all the operations (concerning logistic, energy supply, management and security operations). In this respect, this task will be devoted to designing a platform for collecting the relevant data, their pre-processing, their storage in a standard format, and their access and management. This objective is achieved by using the data as centerpiece of the architecture as presented below.

Task 2.7.2. Network architecture - In this task, the network infrastructure design will be finalized, taking into account all the most recent suitable technologies and the requirements expressed by the other WP2 tasks and by the target ports. A relevant role here might be played by the integrated application of 5G and satellite

technologies. More specifically, the 5G can support massive IoT for effective monitoring of the port environment and low latency and high-reliability communications with adequate edge computing capabilities. With a 5G coverage that includes a wired high-speed infrastructure from public network providers, it is also possible to extract a dedicated network with its specific performance by exploiting the "slicing" capability of 5G technologies. Moreover, the 5G allows the integration and fast access to local small data centers for supporting edge computing features. These features are essential for real-time control of low latency tasks, useful both in the energy distribution networks, remote and secure management of cranes and goods/containers handling vehicles, and finally, the effective support of Artificial Intelligent (AI) capabilities. The integration of satellite networks can add large-scale noninvasive data able with different views that, correlated with the local data, can enlarge the monitoring area also far out of the ports, enabling control over vessels' virtuous behavior even outside the port area. Moreover, satellite networks can connect far sensors (e.g., installed on buoys or ships), enlarging the monitored area again, especially on the seaside. Finally, the 5G and the satellite networks simultaneously operating can increase the entire system's reliability, given a mechanism for fast identification and efficient recovery of exceptional dangerous situations (fires, explosions, leaking hazardous liquids). Considering the relevant energy consumption of modern ICT technologies, specific attention will be posed in selecting technologies and approaches for minimizing the energy consumption of the network equipment. This goal will be pursued by adopting power management techniques, adopting renewable energy sources, and finally monitoring the energy performance of the network infrastructure.

Task 2.7.3. Computational architecture - The computational architecture represents another relevant aspect in the global ICT architecture. As already mentioned in the network sub-task, the reliability and latency performances, together with the high-level computational effort requested by many of the possible port services, require an approach based on a mix of cloud and local (edge, fog) computing. The reference architecture will be established to be able to effectively manage all service requirements, as requested by the other tasks, giving the opportunity of localizing the processing or the pre-processing near the source/destination of the data and to migrate or scale the different services dynamically depending on the current needs. This architecture will be possibly integrated with the network architecture, especially in adopting a 5G radio mobile infrastructure. Also here, the energy consumption minimization will be considered by applying the best practices in the field with specific customization for the particular environment.

Task 2.7.4. Cyber Security - In every contest in which digital technologies play a central role, Cyber Security must play a central role and be integrated into the system "by design." This task's objective is to design a security control and monitoring architecture able to effectively monitor and manage all the potential issues of the entire port ICT architecture. This architecture will be defined in parallel with the other parts of the global ICT architecture by identifying the monitoring and protection services to exploit and their specific characteristics, including the functionalities related to monitoring the different services and infrastructure's current security state.

Key personnel

Massimo FIGARI (M) - Professor Biography:

Massimo FIGARI is graduated in 1989 in Naval Architecture and Marine Engineering at Genoa University cum laude, served as Marine Engineer Officer in Italian Navy in 1990-1991, worked at CETENA (Fincantieri Group) in the research military activity for 3 years then joined University of Genoa as researcher, Associate Professor in 2002 and Professor in 2020. He is currently also Visiting Professor at Gdansk University of Technology and lecturer at Italian Navy Maritime Academy in Leghorn. His research interests focus on the simulation of ship performance and environmental impacts reduction. He is author of more than 100 publications in the Marine Engineering field, 72 publications are currently indexed by Scopus with a h

index of 16. He contributed to 8 EU Projects and 18 other Projects. Presently he is leading the UNIGE team in VENTuRE H2020 Widespread Project as well as is participating to the new UNIGE teaching and research infrastructure SHIL as expert in marine engineering simulation.

Raffaele BOLLA (M) - Full Professor at DITEN, coordinator of the Master Course in Internet and Multimedia Engineering, and vice-director and representative of the Genoa University of the National Inter-University Consortium for Telecommunications (CNIT):

His research activities cover several ICT areas, including Internet technologies, mobile radio cellular networks (5G and behind), cybersecurity, and cloud and edge computing communications and services. He has participated in many national and European research projects (FP7 and H2020) in collaboration with several leading industries, also with the role of Principal Investigator. Author of more than 200 scientific papers in magazines, national and international conferences, he currently has more than 2200 citations and an h-index of 20 on Scopus. He is Involved in many standardization initiatives of ETSI and ITU-T, mainly in the area of ICT sustainability. In ETSI, he is part of the Environmental Engineering Technical Committee, where it guided, as Rapporteur, the standardization of the Green Abstraction Layer (GAL).

Federico SILVESTRO (M) - Deputy Director of the Department of Marine, Electrical, Electronic and Telecommunications Engineering – DITEN :

Federico SILVESTRO is graduated in Electrical Engineering and PhD in electrical energy systems at the University of Genova in 1998 and 2002 respectively. Since 2002 Research Assistant at the Dept. of Electrical Engineering of the University of Genova and since 2010, Assistant Professor (ING / IND 33 - Electrical Energy Systems) at the University of Genova. Full Professor at DITEN. Research activities cover several areas including: development and implementation of electrical market models, management and control of transmission systems and distribution systems in the presence of distributed generation and real-time power load management. He has participated in several national and European research projects in collaboration with several leading industries. Author of more than 220 scientific papers in magazines, national and international conferences. He is reviewer of International journals such as IEEE, Electric Power Systems Research and several international conferences on electrical power systems. Member of AEIT, of IEEE Power Engineering Society and of several CIGRE Working Groups. He is currently secretary of IEEE Marine Systems Coordination Committee.

Fabio D'AGOSTINO (M) - Research Fellow (RTD-a):

Fabio D'AGOSTINO is graduated in master's degree (2013) and the PhD (2017) in Electrical Engineering from the University of Genova, where he is now a Research Fellow, employed as Assistant Professor at the Department of Electrical, Electronic, Telecommunication Engineering and Naval Architecture. Member of the IEEE Power Engineering Society, and of the IEEE Marine Systems Coordination Committee. His main research activities regard protection and control of power distribution systems, microgrids and shipboard power plants, fuel cells and battery energy storage system applications, and distribution system reliability. In 2015 he has been a Visiting Scholar at the Electrical Engineering and Computer Science department of the Washington State University, where he worked in collaboration with the U.S. Department of Energy. In 2012 he has been a member of the working group of the University of Genova for the international project Distributed Energy Resources Research Infrastructure, at the University of Strathclyde, Glasgow, Scotland.

Davide GIGLIO (M) - Associate Professor of transportation engineering at University of Genova, Italy:

Davide GIGLIO is received the Laurea Degree (MSc equivalent) in Computer Science Engineering and the PhD in Computer Science and Electronic Engineering in 1997 and 2001, respectively. He currently teaches “Planning and management of transport systems” (BSc in Management Engineering), “Safe and reliable transport systems” and “Smart logistics and automated transport systems” (MSc in Safety Engineering for Transport, Logistics, and Production). His past and present research interests include, but are not limited to,

<p>urban mobility optimization, modelling and control of urban traffic networks, optimization of logistics systems and supply chains, logistics of hazardous materials.</p> <p>Davide Giglio has been involved in several research projects in the fields of info-mobility, modelling and optimization of road traffic networks, and management of logistic networks. Recently, he has led the National projects PLUG-IN (on info-mobility) and MIE (on sustainable mobility), funded by Ministry of Education, University and Research (MIUR), and participated in the European project STM (on sea traffic management) and the National project ARES (on port logistics optimization).</p> <p>He is inventor of the patent "Method for managing the distribution of products or goods" and author of about 90 scientific papers which appeared on national and international journals and books and on national and international conference proceedings.</p>
<p>Lorenzo SCHIANO DI PEPE (M) :</p> <p>Lorenzo SCHIANO DI PEPE has earned law degrees at the University of Genoa, University College London, Georgetown University Law Center (as a Fulbright fellow), University of Milan. He has taught for more than 15 years including courses in international law, EU law, international and EU environmental law and law of the sea. He has published widely in the same areas and he is a frequent chairman, speaker or discussant at international conferences in his fields of expertise. He has been the coordinator of a Jean Monnet Module on EU and the Law of the Sea and is currently a Jean Monnet Chair in International and EU Law of the Sea. Since 2015 he has convened the "EULoS" (EU and the Law of the Sea) summer school, regularly attracting researchers, civil servants and other professionals from around the world. He is on the scientific committee of "Il diritto marittimo", the Italian leading maritime law journal and on the editorial board of "Rivista giuridica dell'ambiente", the Italian leading environmental law journal.</p>
<p>Relevant Projects</p>
<p>VENTuRE – P.N. 856887 - WIDESPREAD-03-2018, https://cordis.europa.eu/project/id/856887/it</p>
<p>HOListic optimisation of SHIP design and operation for life cycle, https://cordis.europa.eu/project/id/689074/it</p>
<p>Docks The Future - P.N. 770064 H2020-MG-2017-SingleStage-INEA, https://cordis.europa.eu/project/id/770064/it</p>
<p>ROBINS - P.N. 779776 H2020-ICT-2017-1, https://cordis.europa.eu/project/id/779776/it</p>
<p>FENIX - A European FEderated Network of Information eXchange in LogistiX, https://fenix-network.eu</p>
<p>Relevant publications and products</p>
<p>A. Consilvio, A. Conca, D. Giglio, and N. Sacco, "A modal choice model for evaluating the impact of increasing automation in container terminals," in <i>TRB 96th Annual Meeting Compendium of Papers</i>, 2017.</p> <p>A. Di Febbraro, F. Gallo, D. Giglio, and N. Sacco, "Traffic management system for smart road networks reserved for self-driving cars", <i>IET Intelligent Transport Systems</i>, vol. 14, no. 9, pp. 1013-1024, 2020.</p>
<p>F. D'Agostino, A. Fidigatti, E. Ragaini and F. Silvestro, "Integration of Shipboard Microgrids Within Land Distribution Networks: Employing a Ship Microgrid to Meet Critical Needs," in <i>IEEE Electrification Magazine</i>, vol. 7, no. 4, pp. 69-80, Dec. 2019, doi: 10.1109/MELE.2019.2943979</p>
<p>Zaccone, R., Ottaviani, E., Figari, M., Altosole, M.</p> <p>Ship voyage optimization for safe and energy-efficient navigation: A dynamic programming approach (2018) <i>Ocean Engineering</i>, 153, pp. 215-224.</p>
<p>Coraddu, A., Oneto, L., Ghio, A., Savio, S., Anguita, D., Figari, M.</p>

Machine learning approaches for improving condition-based maintenance of naval propulsion plants (2016) Proceedings of the Institution of Mechanical Engineers Part M: Journal of Engineering for the Maritime Environment, 230 (1), pp. 136-153.

Infrastructures

ShIL infrastructure. The ShIL infrastructure is a co-simulation platform equipped with:

- a) a ship-bridge simulator,
- b) a real-time electric simulator,
- c) a full converter with storage, supercap, fuel cell and PV,
- d) lab-scale ship model and
- e) 5G telecommunication simulator.

A testbed for realizing laboratory tests with 5G and cloud technologies and services.

Klaipėdos Universitetas	 Klaipėdos universitetas
Description of the organisation	
<p>Klaipėda University (KU) was established in 1991 for the development of Lithuania as maritime state and creating a modern research infrastructure for the general needs of country's maritime industry, shipping and port development, marine science and technologies. Two KU subdivisions Maritime Research Institute and the Faculty of Marine Technology and Natural Sciences keep the strongest focus on coastal and marine issues. Those, equipped with advanced research facilities, got together scientists and researchers for common activities such as technological and sustainable development of blue economy, investigation the impact of the global change on the marine and coastal natural resources and ecosystems, implementation the goals of the EU integrated maritime policy, and to train highly skilled human resources. KU academic activities fit to the international, national and city political context: i) to turn the Baltic Sea into a clean shipping region and to save the sea (The EU Strategy for the Baltic Sea Region); ii) to develop advanced technologies and products for resource-saving, environmental pollution and climate change management (Lithuanian Progress Strategy 'Lithuania 2030'); iii) to become a worldclass blue economy city offering rapid solutions: the best place to live, work, rest and invest in the Baltic region (Blue Breakthrough Strategy Klaipėda 2030). In order to achieve blue growth, local society will use the sea and the coastline sustainably, build and introduce bio- and clean technology solutions; become an Industry 4.0 competence centre; provide digital creative and professional services. Among strategic directions is to develop an innovative education and science ecosystem that would meet the needs of tomorrow's economy.</p>	
<p>Recognizing the rapid and dramatic changes in society and higher education, in 2017 a new long-term strategy 'KU 2030' was launched. The development of this document was closely linked to the Klaipėda Economic Development Strategy 2030. The new strategy even more focuses on strengthening the internationalization of science and studies, the development of digitalised decision-making management and studies, the issues of commercialization of scientific knowledge. EU-CONEXUS project is an excellent opportunity to find congenial team consolidated by similar ambition, able to develop knowledge, innovation, and share it with wider academic and public society. The activities of the project Alliance fit well to strategic aims of the University i) to open education programmes to international students, teaching staff and researchers; ii) to enhance the scope of education programmes in coastal issues, particularly addressing upcoming issues in marine biotechnology, aquaculture, coastal sustainability, marine hydrology, marine environment engineering, civil engineering and port constructions, green transport, energy efficiency, smart port city etc; iii) to increase interdisciplinary scope of education programmes by extending collaboration with Alliance members; iv) to enhance international cooperation in joint research activities; v) to increase the level of institutional internationalisation through physical and virtual mobility; vi) to reach strategic goals. KU cooperates with numerous partners both in Lithuania and abroad. The University has concluded bilateral and Erasmus cooperation agreements with 86 institutions in 28 countries. KU is a member of different international organisations and networks: BUP – Baltic University Network, EMUNI University, EU2S2 – European Union of Universities of Small States, Estuarine & Coastal Sciences Association, EUCC- The Coastal Union Baltic, World Wind Energy Association, Baltic Sea LNG cluster, Baltic Sea LNG competence centre and many others. The most relevant cooperation with national organisations, Maritime Digital Innovation Hub, Lithuanian LNG Cluster, Competence Centre, and Platform.</p>	
<p>Klaipėda is a multipurpose, universal, deep-water port and the biggest Lithuanian transport hub, connecting sea, land and railway routes from East to West. Tens of large stevedoring companies, ship repair and ship building yards as well as hundreds of all types of companies of marine business and cargo handling services</p>	

operate within the port surrounded by an exceptional natural environment, the Curonian Spit National Park - UNESCO heritage.

KU researchers are involved in making decisions on how to combine industrial growth and preserve natural heritage. In the fields related to the project KU runs study programmes from undergraduate to doctoral level in Ecology, Biology and marine biotechnology, Hydrology and oceanography. KU engineering departments run study programmes Shipping and port engineering, Civil engineering and port constructions, Marine environmental engineering, Robotics, IT etc. KU runs Smart internship, social entrepreneurship and creativity projects for students and involves them into developing social business projects for better integration of foreigners into city life. KU has already taken a broad step forward in the implementation of gender equality concepts and family-friendly measures. The Gender Equality Plan emphasizes the implementation of gender equality projects, the elimination of gender stereotypes in teaching materials aiming to attract more girls to study and work in STEAM (Science, Technology, Engineering, Art (Design), Mathematics) fields. Moreover, in the KU campus it has been developing STEAM Centre for city and region pupils. Klaipeda Science and Technology Park and Business Incubator operating an experimental base for industrial shrimp farming are situated in the KU campus as well.

Relevant skills/experience/technologies

The researchers of Klaipeda university have the long-term experience in creation of vessel concepts and technologies using alternative fuels and power sources. CFD simulations and prototyping are widely used in the research projects for optimizing the exploitation parameters of the vessels, such as: hydrodynamic studies of ship hull shapes, for reducing water resistance, fuel consumption and air pollution indicators; research on the pitching and heaving of ships, improving safety of their operation. Klaipeda University has the equipment and the experience to execute air pollution measurements and measurements of emissions from ships. There is also an experience in research of the work of engines on alternative fuels, research on engine work parameters in stationary and transient regimes and improving its environmental, energy and reliability indicators. Long-term experience in research on port planning, logistics, transport corridors and multimodal transportation

Role in the project

Klaipeda University will contribute in the project by executing air pollution measurements (CO₂) for the following research cases: i) measurements of emissions of a conventional locomotive for different operation modes, with further measurement data processing and providing it to the modelling tool; measurements of emissions of a conventional pilot boat/hydrographic boat for different operation modes with further measurement data processing and providing it to the modelling tool. Klaipeda University will support University of Genova in vessels concept development. Vessels concepts that are to be developed are planned to be purchased by Klaipeda port authority: pilot boat, port sewage tanker. Vessels will be developed with hybrid propulsion utilizing green hydrogen as an alternative power source. Klaipeda university will also support Klaipeda port authority in project implementation procedures: providing experience in implementation of green technologies, optimizing port operations, using smart technologies in transportation chains, helping in organizing the interactions between all port-related stakeholders

Key personnel

Vasilij DJACKOV (M) - Assoc. prof. dr.:

Vasilij DJACKOV born in 1975, in 1997 has received bachelor degree in ship engineering, in 1998 engineer degree in ship engineering, in 2000 master degree in port management and in 2005 PhD degree in technical sciences. Has more than 20 years of practical ship design and building supervision, including creation of innovative new types of vessels, using alternative energy power sources. Has experience in CFD modelling

<p>of hydrodynamic processes, with application to practical issues of vessel design and creation of “green” vessel modernization technologies. Has the experience of participation in national and international research projects as an organization project leader. Scientific interests and experience in ship design, marine transport technologies, stability and sea keeping, CFD modelling, unmanned autonomous surface vehicles.</p>
<p>Paulius RAPALIS (M) - assoc. prof. dr.:</p> <p>Paulius RAPALIS, born 1987, In 2011 started to work in Klaipeda university air pollution from ships research laboratory as a technician. In 2012 finished master degree in marine technology. At the same year started to study for PhD, finished in 2017, currently working as a head of Waterborne transport and air pollution laboratory. Has the experience of participation in national and international research projects as an organization project leader. Scientific interests and experience in emissions from ships and other air pollution sources measurements and modelling technics, use of alternative fuels in marine and land transport, CFD modelling, marine transport technologies.</p>
<p>Rima MICKEVICIENE (F) - assoc. prof. dr.:</p> <p>Rima MICKEVICIENE is dean of the faculty of Marine Technology and Natural Sciences of Klaipeda University and assoc. prof. of the Marine Engineering Department. Key fields of research are related to shipping energy efficiency, development of eco-innovative technologies, and increasing competitiveness of the maritime industry as well as gender equality in science and technology. She is an author and co-author of 34 scientific papers. International project experience: FP6 ENCOMAR – TRANSPORT; FP6 EUROMAR BRIDGES; FP6 EUROMIND; FP7 ECOREFITEC; FP7 REMCAP; H2020 Baltic Gender; H2020 EU CONEXUS Research for Society. International project coordination and management experience: LdV EUROWELD; LdV EUROWIP; Erasmus “European University Smart Urban Coastal Sustainability”; European Structural Fund “Seafarer”.</p>
<p>Vytautas PAULAUSKAS (M) - prof. habil. dr.:</p> <p>Vytautas Paulauskas is graduated in Maritime Academy in Kaliningrad, degree Master marine in 1974 finished. After finishing Maritime Academy worked as mate and Captain on cargo ships, tankers and reefer ships. In 1979 defended PhD in St.-Petersburg Maritime Academy. In 1993 defended Habilitate Dr. dissertation in Vilnius Technical University in Transport Technology. From 1990 until 1993 worked on Director position of the Waterborne Transport Department in Lithuania Transport Ministry. Since 1993 Head of Shipping Department, professor in Klaipeda University. Has more than 250 publications, including 35 monographs and books for students, more than 100 scientific projects in logistics, intermodal transport, shipping, shipping and navigation safety, port management, environmental, transport technology, LNG terminals planning and safety, LNG distribution and other scientific fields, lecture and coordinator on more than 100 international seminars on Port Management, Transport Technology, Transport logistics, LNG items, Shipping and Navigational safety.</p>
<p>Relevant Projects</p>
<p>BSR Seed Money Facility project, Baltic SEA inteGrated unmanned aerial vehicle multifunctional monitoring system for resurveying of shipping routes (SEAGLE), 2016-2017.</p>
<p>Interreg South Baltic project “Supporting South Baltic SMEs to enter the international supply chains & sales markets for boats & ships with electric propulsions” (ELMAR), 2017-2021. <u>Home Electric Water Mobility (electric-water-mobility.eu)</u></p>
<p>Lithuania national research funds. Future autonomous green port: The creation on new container loading method and system prototype. Nr. 01.2.2-LMT-K-718-01-0081, 2017-2021.</p>
<p>BONUS project. ZERO EMISSIONS IN THE BALTIC SEA (ZEB) (<u>www.bonusportal.org/projects/innovation_projects/zeb</u>)</p>

2014-2020 Operational Programme for the European Union Funds Investments in Lithuania. Development of an autonomous passenger ferry technology prototype, 2020-2022.
Relevant publications and products
Guseinoviene E., Djackov V., Januteniene J., Boguzaitė B., Jankunas V., Senulis A., Didziokas R., Zapnickas T. (2018). Case Study of Small Electric Ship Energy Consumption with Power Supply Capacity Estimation. <i>6th Eur. Conf. Ren. Energy Sys.</i> Istanbul, Turkey, 1369-1379.
Djackov V., Zapnickas T., Cerka J., Mickeviciene R., Asmontas Z., Norkevicius L., Ronkaityte I., Zhou P., Blanco-Davis E. (2018). Numerical simulation of a research vessel's aftpart hull form. <i>Ocean Engineering</i> 169, 418–427.
Rimkus A., Zaglinskis J., Stravinskas S., Rapalis P., Matijosius J., Bereczky A.(2019). Research on the combustion, energy and emission parameters of various concentration blends of hydrotreated vegetable oil biofuel and diesel fuel in a compression-ignition engine. <i>Energies</i> . vol. 12, iss. 15, art. no. 2978, 1-18.
Paulauskas V., Filina-Dawidowicz L., Paulauskas D. (2020). The Method to Decrease Emissions from Ships in Port Areas // <i>Sustainability. MDPI</i> , Vol. 12, Iss. 11, Art. No. 4374, 1-15.
Wang Z., Lebedevas S., Rapalis P., Zaglinskis J., Mickeviciene R., Djackov V. and Liu (2020). Use of LNG Cold Potential in the Cogeneration Cycle of Ship Power Plants. <i>Journal of Marine Science Engineering</i> , 8, 720, 1-23.
Infrastructures
Mobile air pollution laboratory for momentary and/or continuous research of air pollution with harmful gaseous components (SO ₂ , NO, NO ₂ , CH, CO, CO ₂) and solid particles (PM ₁₀ , PM _{2.5} , PMT) in contamination territories and neighbouring environments.
Visual ship bridge simulator “SimFlex NAVIGATOT” with possibilities investigate ships maneuverability, assist evaluate optimal ports channels, ships turning basins, fuel consumption, emissions from ships in ports during ships entering in port.

Centre for Research and Technology Hellas (CERTH)/ Chemical Process & Energy Resources Institute (CPERI) & Information Technologies Institute (ITI)	
Description of the organisation	
<p>The Centre for Research and Technology-Hellas Hellas (CE.R.T.H.) is a legal, non-profit Government entity organized under private law, under the auspices of the General Secretariat for Research and Technology (GSRT), of the Greek Ministry of Development. CE.R.T.H. is the only research Centre in Northern Greece, one of the largest in the country and has received numerous awards and distinctions such as the European Descartes Prize, the European Research Council (ERC) Advanced Grant, Microsoft International Contest Prize, the Trading Agents Competition Award and many more. More than 800 people work at CE.R.T.H. with the majority being engineers and scientists. CERTH's research results that are more than 500 publications / year, have extremely significant scientific impact (about 7,100 heterocitations / year) and an annual turnover almost equal to 30 M €. Its is also listed among the Top-20 of the EU's Research Centres with the highest participation in competitive research grants, while the active projects per year are more than 300 and more than 5,000 in total. Two CERTH institutes, namely the Chemical Process & Energy Resources Institute and the Information Technologies Institute, will participate in the project. On March 30, 2012 Chemical Process Engineering Research Institute (CPERI) merged with Institute for Solid Fuels Technology and Applications (ISFTA) to establish the Chemical Process & Energy Resources Institute (CPERI) which contributes to the increased competitiveness of the Greek and European industry by providing unique and innovative solutions to research problems of technological and/or commercial interest and is one of the six institutes of the Centre for Research and Technology Hellas. CPERI, which today extends over 4.989 m2 of office and laboratory space and possesses 1.797 m2 of storage space., employs around 200 people including scientists (i.e. chemical engineers, chemists, mechanical engineers). The scientific output produced is reflected by the yearly number of publications that range between 90 and 110 with more than 2000 heterocitations, even though a significant part of the scientific work and results produced is not published due to NDAs with the industrial partners. The annual turnover exceeds 8M€ and the main sources of funding are Research Projects (around 55%), Industrial contracts and Services (around 35%) and Regular Governmental Funding (around 10%). CPERI consists of seven laboratories, organized into three research and development divisions. The activities of the laboratories are supported by a horizontal technical division, which involves the large pilot-plant units and the analytical department. More specifically, the present organisation of CPERI has as follows: Laboratory of Environmental Fuels and Hydrocarbons, Laboratory of Polymer Reaction Engineering, Laboratory of Natural Resources and Renewable Energies Utilization, Aerosol and Particle Technology Laboratory , Laboratory of Inorganic Materials , Laboratory of Process Systems Design and Implementation, Biological Computation & Process Laboratory, Analytical Services Unit, Laboratory of Alternative Fuels and Technologies in Ptolemais. CPERI's mission is to conduct high calibre basic and applied research, to develop novel technologies and products and to pursue scientific and technological excellence in selected advanced areas of: 1. Chemical Engineering including Energy (Production and utilization of clean and upgraded conventional fuels, of solar fuels, of biomass based fuels and materials (solid, liquid and gaseous biofuels and biorefinery), Utilization of Liquefied Natural Gas (LNG) as marine fuel and other uses), 2. Environmental Research (water and air pollution and related activities and solid waste and related activities), 3. Materials Research (Comprehension and control of the functional material qualities on atomic level and synthesis of new materials with the desired functional properties, Control and comprehension of the nano- and microstructure of the materials, Applied Catalysis technology), and 4. Industrial Processes Research (Processing of water, industrial and agricultural by-</p>	

products, Processing and purification of automotive exhaust gases, Polymer production, Pharmaceutical production, Simulation, optimization and automated control of process systems).

The Information Technologies Institute (ITI, www.iti.gr) – formerly known as Informatics and Telematics Institute is one of the leading Research Institutes of Greece in the field of Information and Communications Technology (ICT). It was founded in 1998 and since 10.3.2000 it is a founding member of CERTH. CERTH-ITI is located in Thessaloniki, Greece and its current Director is Dr. Dimitrios Tzovaras. CERTH-ITI is one of the leading Greek institutions in the field of Information and Communications Technology (ICT) with long experience in numerous European and national R&D projects. CERTH-ITI has participated in more than 80 EC IST projects – having coordinated at least 20 of them – and more than 100 National research projects or private sector Consulting Subcontracts. Over the last six years, the ITI research team has authored over 150 publications in scientific journals and has presented over 300 papers in international conferences (for a complete list please see our website). CERTH-ITI has a staff of 9 researchers, and more than 200 employees including university professors, fellows and assistants as well as administration and technical staff. The Institute collaborates with Imperial College, the University of Surrey and the Aristotelian University of Thessaloniki for the award of PhD degrees.

The focus of the Visual Computing Laboratory (VCL) participating in the project is to develop new algorithms and architectures for applications in the areas of machine learning and Artificial Intelligence, big data analysis, computer vision, image/video processing and other fields. It has 2 full-time senior researchers and 52 full-time researcher associates. VCL enjoys a distinguished reputation for innovation, receiving direct funding from private national and international companies and the EU. The group has participated in, and coordinated several relevant EU funded projects.

Relevant skills/experience/technologies

CPERI has a strong background on relevant with the proposed activities, with a team of experts on preparing studies and conducting measurements campaigns for the air pollution caused by the movement of the vessels. Air pollution measurements (particulates, nitric oxide, nitrogen dioxide, oxygen, ozone, sulfur dioxide) and meteorological data (wind speed and direction) collected by different technological equipment -portable and not- ensuring a strong skill and experience. Moreover, CPERI is undertaking techno-economic feasibility studies for the potential synergies with other uses of alternative marine fuels. CERTH/CPERI has a team of experts on LCA/LCC modelling for performing the relevant environmental and economic studies. Simulations of various energy systems and processes have been performed using commercial tools (e.g. SimaPro) and custom-made tools in programming languages (Python). In addition, CERTH team has developed customized databases based on European projects that it is involved. CERTH- ITI conducts applied research in a vast area of Informatics and Telecommunications technologies, including: Image and signal processing, computer vision, Pattern Recognition and Data Mining, Artificial Intelligence, ICT for Environment Monitoring, Geosciences and Remote Sensing, Security and Surveillance.

In particular, in the field of Machine Learning, the latest research efforts are focusing on the SoA Deep Learning techniques, to further improve classification and recognition. ITI has extensively used and extended state-of-the-art machine learning approaches including graph-based and manifold learning, deep learning, and reinforcement learning. ITI researchers also investigate the development of techniques combining explicit knowledge, context and probabilistic approaches. Furthermore, in the last few years ITI researchers have gained significant experience in using deep learning techniques and in developing new deep learning architectures for addressing image and video analysis and understanding problems. In the field of space technologies and remote sensing, ITI has significant experience in combining information from satellite images and other ancillary sources so as to perform reasoning, taking into consideration the uncertainty of the data, toward working out risks of desertification and landslides, identifying specific

objects on the ground and analyzing seismic data for helping the identification of potential oil and natural gas reserves. In a similar context, ITI has expertise in combining heterogeneous environmental data (weather forecasts, air quality, etc.) in order to provide personalized and decision support applications. ITI is moreover specializing in change detection via the fusion of remote sensing primary and secondary products acquired from various altitudes (spaceborne images to ground measurements) to support monitoring and management activities in the fields of Ecology, Spatial Planning, Energy, and Health.

Role in the project

CERTH / CPERI could have a significant technical contribution in the project due the previous experience that has with relevant atmospheric and meteorological data collection procedures. Through the suitable technological equipment, CPERI could initially collect data and then provide a clear picture of the atmospheric data of the ports' region in absolute line with legislation and directives. Air quality measurements campaigns conducted by CPERI, that could refer to wind speed and direction, rainfall, barometric pressure, temperature, relative humidity, heat stress, particulates, ammonia, carbon monoxide, carbon dioxide, formaldehyde, hydrocarbons, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, methane, nitric oxide, nitrogen dioxide, oxygen, ozone and sulfur dioxide could lead to the accurate air modeling of the area. Moreover, CPERI could provide measurements and monitoring regarding water and noise pollution. CERTH/ ITI is expected to contribute based on their significant expertise on machine learning and Artificial Intelligence, big data analysis, computer vision and image processing and applications development. Expected contributions include oil spill and detection, marine plastic pollution for environmental monitoring, as well as big data analysis for decision support using a novel Explainable Artificial Intelligence (EAI) algorithm. The latter will be based on the evaluation of a new Green Port Performance Index for sustainable ports to be defined within the project and to be computed by combining heterogeneous data from relevant data sources.

Key personnel

Kosmas DIMITROPOULOS (M) - Senior Researcher and academic director of AIMOVE Post-Master Programme for CERTH:

Kosmas is graduated AIMove – “Artificial Intelligence and Movement in Industries and Creation” at MINES ParisTech University, France. He holds a diploma in Electrical and Computer Engineering and a Ph.D. degree in Applied Informatics. His main research interests lie in the fields of multi-dimensional data modelling and analysis, artificial intelligence, pattern recognition, human computer interaction, virtual reality and serious games. His involvement with these research areas has led to the co-authoring of more than 120 publications in refereed journals and international conference proceedings. He has been the technical coordinator, quality project manager, deputy project coordinator and work-package leader in several European and national research projects and has served as a regular reviewer for a number of international journals and conferences. He is a member of IEEE and the Technical Chamber of Greece.

Petros DARAS (M) - Senior Researcher and Chair of the Visual Computing Lab:

Petros is graduated of the Diploma in Electrical and Computer Engineering, the MSc and the Ph.D. degrees in Electrical and Computer Engineering all from the Aristotle University of Thessaloniki, Greece in 1999, 2002 and 2005, respectively. His main research interests include visual content processing, multimedia indexing, search engines, recommendation algorithms and relevance feedback. His involvement with those research areas has led to the co-authoring of more than 150 papers in refereed journals and international conferences. Dr Daras has been involved in more than 20 projects, funded by the EC and the Greek Ministry of Research and Technology. Among them, he is the Technical Manager of the EC projects VICTORY, I-SEARCH and ADVISE. Dr. Daras is a Senior member of IEEE. He regularly acts as a reviewer for the European Commission and the GSRT.

Nikos GRAMMALIDIS (M) - Senior Researcher (Grade B') at CERTH-ITI:

Nikos is graduates of the Diploma in Electrical and Computer Engineering and the Ph.D. degree in Electrical and Computer Engineering all from the Aristotelio Panepistimio Thessalonikis, Greece in 1992 and 2000, respectively. His main research interests include: Image, Video and Multi-dimensional signal Processing, Computer vision, Machine learning, Intelligent Systems and Applications, Fire and Smoke Detection, Analysis, Modeling and Visualization of body movement and facial expressions. His involvement with those research areas has led to the co-authoring of more than 130 articles in refereed international journals and conferences. He has received the IET Premium Award 2012 and the Euromed 2012 Best Full Paper Award, as a co-author in scientific papers. Since 1992, he has been involved in more than 15 projects funded by the EC and 13 by the Greek General Secretariat of Research and Technology. He has been the coordinator of several European and National research projects, including FP7 IP i-Treasures and FIRESENSE projects.

Dimitrios KONSTANTINIDIS (M) - Postdoctoral researcher in the Visual Computing Lab (VCL) of CERTH-ITI:

Dimitrios is graduates in .Sc degree in Electrical and Computer Engineering from the Aristotle University of Thessaloniki (AUTH) in 2009. He then received an Advanced Master degree in Artificial Intelligence from KU Leuven in 2012 and a PhD from Imperial College of London with the topic of monitoring urban changes from satellite images in 2017. His main research interests lie in the fields of computer vision, image processing, machine/deep learning and artificial intelligence.

Panagiotis GRAMMELIS (M) - Director of Research at the Chemical Process and Energy Resources Institute of CERTH (CERTH/CPERI):

Panagiotis is a researcher in the exploitation of solid fuels, i.e. biomass/waste and coal, with emphasis on the thermochemical conversion technologies. He is experienced in numerous EU and national funded and industry oriented projects, with an extensive knowledge of the South-East European market. Since May 2011, Dr Grammelis is Head of the Laboratory of Alternative Fuels & Technologies and guides a team of highly-skilled researchers. He has been Steering Committee member of the Biomass Panel in the RHC-ETP (responsible for industrial boilers and district heating), national expert for the standardisation of solid biofuels and member of DHC+ (District Heating & Cooling) Platform. Member of the Editorial Board in IJER and IJGW and the Scientific Committees of international conferences (EUBCE, GCGW, WSED). He is co-author in 357 papers in scientific journals, international conferences, workshops and books, with 2.868 citations and h-Index 30 according to Scopus

Adamantios MITSOTAKIS (M) - Research Associate: Political Scientist (Pantios University):

Adamantios is graduated in a DEA in Political Sociology and a PhD in International Relations from Paris (ParisX-Nanterre). The last 10 years, the scope of his research is the Intermodal Transports (Marco Polo projects), the air pollution reduction in ports and the alternative marine fuels, mainly the LNG. He is working as a Research Associate at CERTH since 2014, in the international communication, the harmonization with the legislation/directives and providing energy and environmental solutions for ports and industrial infrastructure.

Dimitrios-Sotirios KOURKOUMPAS (M) - Research Engineer:

Dimitrios-Sotirios is graduates in a MSc Mechanical Engineer (National Technical University of Athens, NTUA) with MSc diploma in Energy and Environmental Management (NTUA). He is specialized in the development of LCA/LCC algorithms/models for integrated energy systems, as well as for biomass and waste to energy processes. In CERTH/CPERI research projects, he coordinates the activities concerning sustainability and circular economy sector. He has participated as Research Engineer in a number of projects funded by the EC, the Greek General Secretariat Research and Technology, as well as various private

entities. His research work has been published in scientific journals, international conferences and workshops (h-index=6, according to Scopus).

Ioannis LOGOTHETIS (M) - Research Associate Physicist :

Ioannis is graduated in an MSc in Atmospheric Physics and a PhD in Climatology and Climate Change. He has participated in many scientific projects relevant also to “cloud computing” technology and meteorology research programmes. He is author in paper in scientific journals and international conferences. His main research interests include climate change, climate change modeling, atmospheric circulation and dynamics of the atmosphere.

Christina ANTONOPOULOU (F) - Research Associate:

Christina ANTONOPOULOU is graduated in Chemical Engineer in 2015, National Technical University of Athens) holding an MSc in Structural Analysis of Monuments & Historical Constructions from CTU (Prague) and UniPD (Padova), and she is currently completing an MSc in Environmental, Disasters and Crises Management Strategies from NKUA (Athens). She is working as a Research Associate at CERTH since 2019. She has worked as an environmental consultant, providing energy and waste management solutions and services relevant to EMAS and ISO 14001 standards.

Relevant Projects

CERTH/CPERI is participating in the EU CEF TRANSPORT project **POSEIDON MED II**, which involves 30 partners and aims to take all the necessary steps towards the adoption of LNG -as marine fuel- in Eastern Mediterranean Sea, specifically in Venice, Igoumenitsa, Patra, Piraeus, Limassol and Vasilikos. The receivables and deliverables of the project was to preparing studies and conducting measurement campaigns for the air pollution caused by the movement of the vessels within Greek and Cypriot ports. Moreover, CPERI is undertaking techno-economic feasibility studies for the potential synergies with other uses of LNG (electricity, transport, industry) in order to maximize the added value of the development of the small scale LNG bunkering facilities in Western Greece and Greek Archipelago area ports.

<https://www.poseidonmedii.eu/>

CERTH/CPERI is participating in the **SUNNIES** project that is a Greek-German bilateral research and innovation cooperation. The scope of the project is the development of integrated solutions based on the SOFC technology, to be tailored for island energy systems such as ports and power plant stations. Due to the new concept, higher efficiency and flexibility should be achieved compared to the existing solutions. The main objective of SUNIES is to develop an integrated solution on poly-generation covering the specific needs of island systems (electricity, heat, refrigeration and drinking water)

The Greece-China bilateral **EPIPELAGIC** project, also involving Geosystems Hellas, focuses on coastal area monitoring and addresses RIS3 priority for “Centers of excellence for environmental studies - Environment & Sustainable Growth because of the Climate Change”. The main objective is to contribute to “mitigation and adaptation to climate change and natural disasters” by providing methodologies and tools using time series of Chinese Satellites (optical, SAR, Geodetical/GPS GNSS) in combination with European Satellite data and auxiliary data. EPIPELAGIC will capitalize on experience gained from previous successful projects, such as **INDES-MUSA**, providing infrastructure such as GPS GNSS base stations that will be upgraded to Beidou technology) or the tide gauge installed in the western dock of the port of Thessaloniki data, and other sensors.

The project will monitor soil subsidence, erosion and degradation in coastal urban/suburban and heavily industrial areas (with gas and oil infrastructures among other industries) with mixed land use and population of all ages and professions, thus contributing to risk mitigation and new planning policies vs the climate change. The proposed integrated monitoring solutions will provide valuable knowledge, methodologies and

state of the art techniques for investigating the related physical mechanisms and will offer an innovative Decision Support Tool to serve the society. Data for coastline monitoring (changes in the coastline, river delta beaches due to environmental conditions, e.g. high waves/climate change and ship traffic) and in-situ measurements vs satellite data (time-series) will also be collected and evaluated. The proposed system architecture consists of Data collection and pre-processing, a Web Process Service (WPS) and a Decision Support System (DSS), implemented in a cloud computing environment. EPIPELAGIC will demonstrate the capabilities of satellites synergistic observations analysis to evaluate suitable indicators and will provide sustainable support to local culture, society, economy and environment.

<https://www.sunies-fuelcell.eu/>

<http://epipelagicproject.com/>

<http://www.indes-musa.gr/>

eOUTLAND — Protecting biodiversity at NATURA 2000 sites and other protected areas from natural hazards through a certified framework for cross-border education, training and support of civil protection volunteers based on innovation and new technologies (2017-2019: INTERREG V-A Greece-Bulgaria 2014-2020,). The project aims to valorise and reinforce the civil protection volunteers of the cross-border area in order to establish a joint certified, integrated and appropriately equipped framework for their education, training and operational support in matters of wildland fire and flood management. This will lead to the enhancement of the cross-border biodiversity protection against natural hazards and the improvement of conservation status of cross-border habitats and also to the protection of societies from upcoming natural disasters.

The main objective of H2020 PROTEIN project, coordinated by CERTH-ITI, is to create an ICT-based system for providing personalized nutrition based on the collection and analysis of large volumes of data related to users' dietary behavioural patterns, physical activity and individual parameters. PROTEIN proposes a radically novel approach to advice and support consumers in everyday living, while ensuring users' privacy protection i.e., data will be anonymized and securely stored in the Cloud for processing.

<https://protein-h2020.eu/>

Relevant publications and products

[Emissions Measurement Campaigns in Greek and Cypriot ports, Sfetsioris K., Mitsotakis A., Grammelis P., 4th Mediterranean Shipping Conference On the way to a Mediterranean Emission Control Area, November 20, 2019.](#)

Sustainable Maritime Transport with LNG between Greek mainland and Islands in the Archipelagos (Archipelago-LNG) in the Field of the Trans-European Transport Network (TEN-T) Sfetsioris K., Gypakis A., Grammelis P., Mitsotakis A. 1st International Conference "ENVIRONMENT & ENERGY in SHIPS 2015", ASHRAE, Piraeus, Greece, May 22-24, 2015

[D.-S. Kourkoumpas et. al, Environment and Development: Basic principles, human activities and environmental implications. Chapter 6 – Energy and the Environment 2016, pages 363-452 doi:10.1016/B978-0-444-62733-9.00006-X \(2016\)](#)

K. Dimitropoulos, P. Barmpoutis, A. Kitsikidis, N. Grammalidis, "Classification of Multidimensional Time-Evolving Data using Histograms of Grassmannian Points", IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), DOI: 10.1109/TCSVT.2016.2631719, Nov.2016

P. Barmpoutis, K. Dimitropoulos, K. Kaza, N. Grammalidis, "Fire Detection from Images using Faster R-CNN and Multidimensional Texture Analysis", IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2019), Brighton, UK, 12-17 May 2019 (to appear).

Infrastructures

Field equipment: The HAZ-SCANNER Model HIM-600 (Complete Air Monitoring Station) that measures and documents trace levels (ppb) gas, particulates, meteorological parameters (wind speed & direction, rainfall, barometric pressure, temperature, relative humidity, heat stress), in real-time calibrated USA EPA & EU directives. Configure up to 12 sensors (particulates, ammonia, carbon monoxide, carbon dioxide, formaldehyde, hydrocarbons, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, methane, nitric oxide, nitrogen dioxide, oxygen, ozone, sulfur dioxide and volatile organic compounds sensor) with true simultaneous PM-2.5 and PM-10 readings. Regarding the enhanced ambient PM monitoring, true dual particulates (with in-line gravimetric filter, inlet heater and moisture trap, are included).



Figure 1: HAZ-SCANNER Model HIM-600

Field equipment: Custom drone with small embedded lightweight air pollution sensors. Sensors subsystem measured pollutants and meteorological parameters are temperature, relative humidity, pressure, such as carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide, ozone, sulfur dioxide and particulates. The drone has a modern flight controller with an increased redundancy of subsystems, GPS module, exacopter UAVs, flight speed that exceeds 6,5 m/s, capability of traction that exceeds 4 kg and flight ability carrying the sensor system that exceeds 30 minutes. Moreover, it has an autonomous flight capability in mapped area, a parachute, emergency pontoons and a suitable ground station in order to control flight parameters and air pollution measurements.



Figure 2: Custom drone with small embedded lightweight air pollution sensors

Commercial LCA tool (SimaPro): SimaPro is a tool to collect, analyze and monitor the sustainability performance data of products and services based on ISO 14044. The software can be used for a variety of applications, such as sustainability reporting, carbon and water foot printing, product design, generating environmental product declarations and determining key performance indicators. SimaPro presents a functionality where the user can modify and adjust in-house code models.

These capabilities allow SimaPro to estimate the overall environmental footprint of virtually any system component and/or processes across all life cycle stages, and identify the hotspots in every link of the supply chain, from extraction of raw materials to manufacturing, distribution, use, and disposal. A polyparametric analysis is also available in the tool. Through the identification of the most crucial parameters, a sensitivity analysis is carried out, in order to estimate the environmental footprint under different operational conditions.

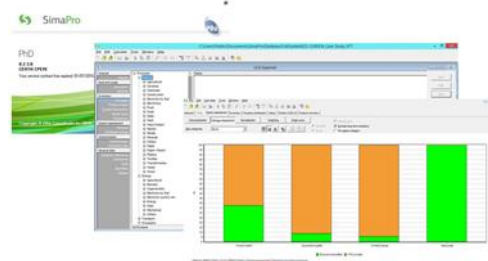


Figure 3: SimaPro tool

Custom-made LCA/LCC tool (VERIFY): Custom made models have been developed in Python for LCA/LCC modelling. The platform has been developed in Ruby on Rails with interactive PostgreSQL Database. VERIFY platform performs real time results. The user can regulate the input data to a desired value, and evaluate the output. The user can adapt his own custom evaluation process according to the user's specifications. A cradle-to-cradle approach has been taken into consideration, in order to conduct the respective environmental assessment. The tool is directly connected with databases (especially with the customized databases). Regarding LCC techniques, an economic evaluation technique has been developed, in order to determine the total cost of owning, operating and disposing of a product, service or technological system throughout its life. This approach implies the recognition of the direct, indirect, recurring, non-recurring costs incurred or expected to incur during the phases of design, research and development, investment, operation, maintenance, shutdown and other support related of a product during its life cycle.

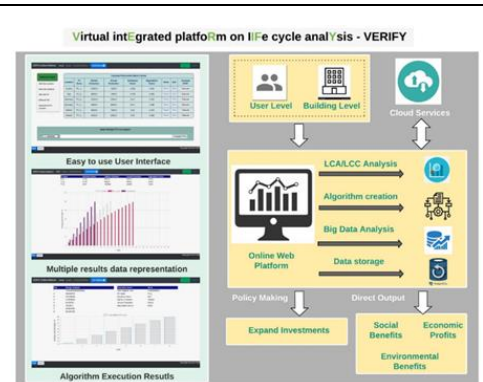



Figure 4: VERIFY platform


Customized databases: CERTH has access to recognized databases, such as Ecoinvent database, for secondary data concerning energy systems and advances processes. Main data concern manufacturing data, technical specifications of equipment/plants/infrastructure, operational data, energy consumptions of secondary processes. In addition CERTH has developed its own customized databases based on data through its involvement in European projects. Data concerns mainly manufacturing and operational data for energy storage solutions and grid specifications. Each database is a standalone database, thus it can be used by any SQL user. The database is provided in a GUI environmental. Based on data given by the user, the database can be expanded.

CERTH-ITI has and will make available to the project part of its computing infrastructure, including : servers, regular PC workstations and laptops that will be used for the everyday activities of the project; three high-end workstations featuring 24-cores, 128GB of RAM, 12 TBs of disk space, CUDA-enabled graphic-card (GeForce GTX 1070) with SSD support and two drones with RGB and multispectral cameras.

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	
Description of the organisation	
<p>The Molecular and Atmospheric Spectrometry Group (GSMA), a joint research unit of CNRS and the University of Reims Champagne Ardenne (URCA). This interdisciplinary laboratory combines fundamental molecular spectroscopy with applications in atmospheric physics and planetology. The GSMA's main institute is the INstitut de Physique (INP), which is attached to the CNRS, and its secondary institute is the Institut National des Sciences de l'Univers (INSU).</p> <p>The laboratory comprises about 50 people (teacher-researchers, researchers, ITA-BIATOSS, postdocs and PhD students) grouped into three research teams and a technical department.</p> <p>Within the GSMA, the "Aeronomy" group has developed strongly in recent years at the laboratory, particularly with regard to its experimental aspects dedicated to the measurement of the main greenhouse gases (CH₄, H₂O, CO₂, ...). The team has developed light instruments embarked under meteorological balloons, under tethered balloons or under drones (PI: Joly L.) which allow on the one hand an in situ measurement of the profile between 0-30 km of altitude and on the other hand an instantaneous spatio-temporal cartography. These instruments, coupled with wind measurements, allow the calculation of gas flows. Some of the measurements contribute to the ICOS (Integrated Carbon Observation System) network. The unit's research work is supported by various national, European and international programmes and also by major industrial groups (TOTAL, etc.).</p>	
Relevant skills/experience/technologies	
The GSMA's skills include molecular spectroscopy, diode laser spectrometry, atmospheric modelling and the ability to offer AMULSE instruments on the ground, under a UAV, tethered balloon or stratospheric balloon	
Role in the project	
Within the framework of this project, the GSMA will contribute its expertise on the development of greenhouse gas emissions quantification systems. This system will couple a network of innovative and autonomous diode laser spectrometers and an atmospheric dispersion model. The GSMA will be in charge of the development of this system, its validation and maintenance.	
Key personnel	
<p>Lilian JOLY (M) - Researcher at the CNRS:</p> <p>Lilian leads a team of 6.5 full time people. His research is at the interface between molecular spectroscopy and atmospheric sciences. Within the framework of these research themes, we are developing diode laser spectrometers for measurements on the ground, under a drone and under a meteorological balloon to make concentration measurements. These measurements coupled with an atmospheric model allow us to quantify greenhouse gas emissions. Lilian is in charge of an ICOS site (https://www.icos-cp.eu/) at the University of Reims. This so-called "MDH" site allows measurements of surface, integrated columns and profiles under balloons between 0-30 km altitude. In parallel to his research activities, Lilian is also the director of a joint laboratory in collaboration with TOTAL, called LYNNA (Laboratoire d'analYses iNnovantes pour les émissioNs Atmosphériques).</p>	
<p>Delphine COMBAZ (F) - Project engineer specializing in instrumentation and greenhouse gases measurement:</p>	

<p>Delphine is graduated in a Master's degree in chemistry (chemical analysis and environment) in 2010, and spent a year working on renewable energy and biomass gasification in the USA. Since 2012, I've specialized in greenhouse gases measurements, and installed and monitored stations from the ICOS network, or Paris urban network. I also handle the data processing from various instruments' concentration measurements, and metrological characterization of AMULSE sensors.</p>
<p>Nicolas DUMELIE (M) - Research engineer specialized in experimental conception and data analysis : Nicolas is graduated in a PhD in material sciences in 2007, focusing on the development of X-ray analysis methods and quantification algorithms applied to biomaterials. Since 2010, he has specialised in the development of inversion and filtering algorithms to recover species concentrations from raw data from AMULSE sensors. He is also working on a communication system for monitoring the state of the sensors.</p>
<p>Jérémie BURGALAT (M) - Research engineer specialized in HPC Jérémie BURGALAT completed a PhD in planetary science in 2012 focused on the development of a numerical model simulating the microphysics of clouds and aerosols under the atmospheric conditions of Titan Saturn's satellite. Since 2015, he specialized in data visualization and developed several softwares for data visualization and realtime monitoring of AMULSE sensors. He also works on inversion algorithms to retrieve species concentrations from raw data of the sensors.</p>
<p>Thomas DECARPENTERIE (M) – Design Engineer: Thomas DECARPENTERIE works in the GSMA lab since 2004 in the area of scientific instrumentation. He co-designed and co-developed several IR laser spectrometers for various field applications, such as eddy correlation fluxes determination or studies of greenhouse gases. He has worked as a CNRS design engineer specialized in electronics board development for over 9 years. His last projects were focused on the design and development of embedded spectrometers : loaded on UAV for TOTAL Company or under stratospheric balloon for scientific community.</p>
<p>Relevant Projects</p>
<p>AUSEA project (Airborne Ultra-light Spectrometer for Environmental Application) https://www.ep.total.com/fr/innovations/recherche-developpement/ausea-un-capteur-aeroporte-sur-drone-pour-mesurer-efficacement - https://www.youtube.com/watch?v=ty1hSCEctgc</p>
<p>MAGIC project https://magic.aeris-data.fr/magic2019/?fbclid=IwAR3trwrFA4lqhzE5JHZg7spEyvkPZca8NqfYWRkGV9k-aE_180OjH0Sd7qw</p>
<p>H2020 HEMERA (Integrated access to balloon-borne platforms for innovative research and technology) https://www.hemera-h2020.eu/</p>
<p>Relevant publications and products</p>
<p>The development of the Atmospheric Measurements by Ultra-Light Spectrometer (AMULSE) greenhouse gas profiling system and application for satellite retrieval validation Lilian Joly et al. Atmos. Meas. Tech., 13, 3099–3118, 2020 - https://doi.org/10.5194/amt-13-3099-2020</p>
<p>Patent : Drone de mesure de données représentatives de teneurs en au moins deux gaz présents dans l'atmosphère à l'écart du sol et procédé de mesure associée - Brevet prioritaire n° 2003027, déposé le 27/03/2020 - Réf. CNRS : 13879-01</p>
<p>TOTAL innovation prize in 2020 for a system to quantify greenhouse gas emissions using a diode laser spectrometer under UAV. (https://www.ep.total.com/fr/innovations/best-innovators-2020/ausea-un-spectrometre-embarque-pour-mieux-tracer-nos-emissions-de)</p>

Atmospheric Measurements by Ultra-Light SpEctrometer (AMULSE) Dedicated to Vertical Profile in Situ Measurements of Carbon Dioxide (CO₂) Under Weather Balloons : Instrumental Development and Field Application”, **Lilian Joly et al.** Sensors, vol. 16, p. 1609, Sep 2016 - <https://doi.org/10.3390/s16101609>.

Hugo Grotius gGmbH	
Description of the organisation	
<p>The Hugo Grotius gGmbH – non-profit society for the advancement of legal sciences is an independent and non-profit research and knowledge dissemination organisation in Germany. The society acts through its independent research institutes: The Institute for the Law of the Sea and International Marine Environmental Law (ISRIM) and the Institute for IT, Media and Intellectual Property Law (MLS LEGAL). The Institute for the Law of the Sea and International Marine Environmental was established in 2012 and has a transdisciplinary approach and co-operates with different local, national and international science and research institutions. The mandate of ISRIM is to enhance the conservation and sustainable use of oceans and their resources by conduction research in international law as reflected in the United Nations Convention on the Law of the Sea (UNCLOS), which provides the legal framework for the conservation and sustainable use of the oceans and their resources, as recalled in Para. 158 of The Future We Want and in goal 14 of the Sustainable Development Goals. The Institute for IT, Media and Intellectual Property Law was established in 2014 and is dealing with questions of legal implementation and law making as well as recent problems of German, EU and international IT, media and intellectual property law.</p>	
Relevant skills/experience/technologies	
<p>The Institute for the Law of the Sea and International Marine Environmental Law is specialised in (1) Maritime Law, including IMO rules and standards, green shipping (2) law of the sea, including UNCLOS and CBD, and (3) environmental law, including climate change, GHG emissions, both in EU and international law. The Institute for IT, Media and Intellectual Property Law is specialised in the (1) IT law, including data protection, artificial intelligence and robotic, virtual and augmented reality (2) media law, including copyright in research, and (3) intellectual property law, including IPR management, licensing, in German, EU and international law.</p>	
Role in the project	
<p>Hugo Grotius gGmbH will lead WP6 on “Green Ports Framework”. In particular, it will lead the activities around the legal frameworks’ establishment whereas it will contribute to sub-task WP6.1.1 “Law of the Sea, Maritime Law and Environmental Law” (Institute for the Law of the Sea and International Marine Environmental Law); and sub-task WP6.1.2 “IT Law, Data Protection Law and Intellectual Property Law” (Institute for IT, Media and Intellectual Property Law).</p> <p>In addition, Hugo Grotius gGmbH will also share a contribution for task WP7 on dissemination activities, raising awareness, engaging communities and citizens, disseminating results, and building knowledge.</p>	
Key personnel	
<p>Andree Kirchner (M) - Prof. Dr.:</p> <p>Andree is director of the Institute for the Law of the Sea and International Marine Environmental Law and professor of international law (Honorarprofessor) at the University of Applied Sciences Bremerhaven, Germany. He is specialized in the law of the sea and international marine environmental law since 1997. He holds a Ph.D. from Hamburg University and a Master (LL.M.) from Stockholm University. He was a research intern at the International Maritime Organization (IMO), the United Nations Environment Programme (UNEP) and the International Tribunal for the Law of the Sea (ITLOS). He will be responsible for the sub-task 6.1.1 “Maritime Law, Law of the Sea and Environmental Law”.</p>	

<p>Iris KIRCHNER-FREIS (F) - Prof. Dr, director of the Institute for IT, Media and Intellectual Property Law and professor of German and European IT, media and intellectual property law (Honorarprofessorin) at the University of Bremen, Department of Computer Science:</p> <p>Iris KIRCHNER-FREIS is specialized in IT law copyright and media law as well as intellectual property law (including IPR Management) since 1997. She holds a Ph.D. and a Master (LL.M.Eur.) from Saarland University as well as a Master from Freiburg University. She will be responsible for the sub-task 6.1.2 “IT Law, Data Protection Law and IP Law”.</p>
Relevant Projects
Research project (2019-2021), <i>Legal Aspects of Virtual and Augmented Reality</i> , in co-operation with the University of Genoa
Research project (2015-2017), <i>Offshore Wind Energy – Protection and Security (OWiSS)</i> , in co-operation with the University of Applied Sciences Bremerhaven, www.owiss.de
EU Project (2001-2003), <i>International Conference on Marine Environmental Law (ICMEL)</i> , in co-operation with the University of Applied Sciences Bremen, www.icmel.de
Jean Monnet Module/Chair, <i>Summer School on “European Union and the Law of the Sea” (EULoS)</i> , in co-operation with the University of Genoa , www.eu-los.eu
Open science project (2016-2017), <i>Freedom of the Seas? A Legal Order for the Seas and Oceans</i> , German Science Year 2016*17 – Seas and Oceans, www.science-year.isrim.de
Relevant publications and products
Kirchner, A. & Kirchner-Freis, I. (Eds.). (2013). <i>Green Innovations and IPR Management</i> . Kluwer Law International
Kirchner, A. (Ed.). (2003). <i>International Marine Environmental Law: Institutions, Implementations and Innovations</i> . Kluwer Law International
ISRIM. (2017, October 27). <i>Protection and preservation of the marine environment</i> [Video]. YouTube. https://www.youtube.com/watch?v=qKgzcqXnIIE
MLS LEGAL (2020, June 26). <i>Datenschutz in der Forschung (data protection in research)</i> [Video]. YouTube https://www.youtube.com/watch?v=Et0hncR0HI8

Thales Alenia Space	
Description of the organisation	
<p>Thales Alenia Space, a joint venture between Thales (67%) and Leonardo (33%), is a key European player in space telecommunications, navigation, Earth observation, exploration and orbital infrastructures. The company posted consolidated revenues of 2.15 billion euros in 2019, and has 7,700 employees in 14 sites in Europe.</p> <p>Thales Alenia Space has designed, integrated, tested, operated and delivered innovative space systems for more than 40 years. Our cutting-edge products and services meet the needs of commercial and government customers from around the world, spanning the space, defence, science and security markets.</p> <p>Thales Alenia Space's satellites, payloads and ground segments are recognized worldwide as benchmarks in delivering communications, navigation and meteorology services, monitoring our environment and the oceans, better understanding climate change and supporting scientific research. In the Copernicus constellation Thales Alenia Space launched the Sentinel 1 radar satellites and the Sentinel 3 that brought key information to the stakeholders about Oceans and Climate change.</p> <p>Thales Alenia Space is the prime contractor of the development and deployment of EGNOS V2 and Galileo G1G. Moreover, Thales Alenia Space is actively involved in the definition of future generations of Galileo and EGNOS, through Galileo G2G on-going activities, EGNOS evolutions, EPICURE, or EGNOS for RAIL. Apart from our strong contribution to the European GNSS evolutions roadmap, Thales Alenia Space is also developing the SBAS system for Korea (KASS). It has just completed the Phase B study for SBAS-Africa for ASECNA. And finally, Thales Alenia Space is a contender in the on-going call for the Australian SBAS where PPP is part of the baseline services.</p> <p>In terms of global infrastructure, Thales Alenia Space is also contributing to different phase A/B projects aiming at defining the PNT missions and systems in both LEO and IGSO orbits, for ESA and CNES.</p>	
Relevant skills/experience/technologies	
<p>With more than 20 years of activities in the navigation domain, Thales Alenia Space (TAS) is recognized as a worldleader in satellite-based navigation systems. TAS background relies on the know-how and expertise of its technical and management teams. TAS is a major actor of EGNOS and Galileo. On both cases TAS demonstrated a unique skill on system architecture and concepts. This includes development and mastering of specific tools in order to assess and guaranty a system performance. Additionally, TAS has strong experience in LBS and was selected as the provider of embedded positioning and antispoofing algorithms within the On Board Units of the French Road User Charging system ECOTAXE.</p> <p>Thales Alenia Space has been a very strong player on the users' segment side (Location Based Services Positioning technology....). Thales Alenia Space successfully developed an Assisted-GPS software receiver hybridization technology with inertial MEMS, and hybridization with wireless network location technology. Thales Alenia Space has also been awarded contracts with mass market handset manufacturers in order to assess performances and compatibility of A-GPS chipsets.</p> <p>From Data collection to New space</p> <p>Unique experience of the ARGOS Data Collect system with a shift towards new space nanosatellite technology on last generation: For more than 20 years, Thales Alenia Space appears as a major partner of</p>	

the CNES for development of the ARGOS data collect system. Thales Alenia Space was first in charge of creating digital processing boards on the ARGOS 3 instruments.

Argos 4 then marked a break in terms of system capability, due to a sharp increase in the on-board processing capability, again under the responsibility of Thales Alenia Space. This was a result of new types of beacon requiring even lower transmission power (about one hundred mW), and opening the door to an IoT type mission. Finally, Argos NEO, in the process of being developed under the responsibility of Thales Alenia Space, in conjunction with Syrlinks, represents a shift towards nanosatellite technology.

The maritime sector with AIS technology

For over 10 years, Thales Alenia Space has been involved in the design and creation of AIS satellite data collection systems. First of all, within the framework of feasibility and performance studies with the CNES (Phase A, Phase A+, various R&T on antenna processing, etc.), the ESA (Artes studies) and the European Commission (Seabila, Dolphin, etc. studies), then within the framework of creating an AIS high performance nanosatellite with the Singapore defence ministry. The challenge consists of creating very high performance multi-antenna processing, onboard a nanosatellite.

Following, on the one hand, the CNES R&T studies on the Argos 4 porting on ARM and, on the other, the antenna processing activities carried out by Thales Alenia Space (on the MEOLUT and the CRPA GNSS), it seemed possible to implement an adaptive antenna processing onboard a nanosatellite, under the following conditions: Use of a new adaptive algorithm, namely MMSE (preferred above algorithms studied up until 2012 for its robustness and relative calculating simplicity); and use of software boards with very high computing capacity, based on an ARM Cortex A9 processor.

It is this approach which was validated for Singapore and led to the design of a high performance multiantenna nanosatellite, capable of detecting 95% of ships in the China Sea in just one passage of a single nanosatellite, when an exact Earth type solution is limited to detecting less than 45% of ships in the same area with 58 satellites, in an observation of 1hr 30.

From ARGOS NEO to KINEIS IoT and AIS new space constellation of 20 Nanosatellites

Thales Alenia Space is part of the consortium of the KINEIS IoT nanosatellite constellation. Thales Alenia Space is in charge of the system and constellation definition, the payload and the ground segment.

Role in the project

Thales Alenia Space will bring an **end-to-end localization & communication chain**, in order to provide transparent, secure connectivity based on trusted geolocation on the whole port & neighborhood.

Thales Alenia Space proposes to provide a unique localization & communication solution to cover the port and its neighborhood, without impact for the users.

The advantage is to facilitate the flows, the data collect and process, the historic, the real-time problem management, in order to optimize the port management. This optimization will directly impact the energy consumption, the waiting time of containers / ships / people on the port, the execution of port operations, etc. The solution combines existing communication & geolocation means : the quick dissemination of the solution will be facilitated by the aggregation of existing communication means, instead of pushing new devices or terminals.

Thales Alenia Space will be in charge of the design, development, test, deployment and validation on a port of the geolocation and communication solution.

The concept covers : Dedicated modules for terrestrial; AIS and sat-based IoT communication; aggregation of location and communication data (Bi-directional communication, accurate and secure location, select the appropriate positioning depending on the requested quality of positioning depending on the application, seamless positioning); processing of the data on a dedicated platform; hosting services and application for added-value services; dedicated user portals, with restricted access, to manage the data: a user can have access to its own fleet location, or communicate to any person of his team.

Communication data & systems : among the following sources
 Terrestrial standardized communication : 3GPP (LTE, NB IoT - cellular communication), but also LoRa & Sigfox : for cellular communications: a specific application, developed on Android, will collect all the data, uplink & downlink, to connect to the platform; for Internet of Things communications: an application will be deployed on the objects, or on the global communication portal (LoRawan center, or any other central application server) to collect all the data; AIS data : all the AIS data will be collected, in order to get the ship position in real time; satellite-based IoT data : able to connect diverse satellite connectivity systems (Argos, Kineis, Iridium, Orbcomm) and to collect the data to be send to the platform, for bi-directionnal communications

Geolocation data & systems : GNSS-only location; hybridized GNSS location : coupled with external sensors as IMU, camera, etc. to provide high accuracy position, with integrity - used for autonomous applications; native IoT satellite location : backup to GNSS location, thanks to the diversity of satellite, with independent sources in order to secure the positioning; cellular terrestrial location: native terrestrial positioning system based on cellular base station; IoT terrestrial location: native location based on LoRa / Sigfox base station; indoor location : based on dedicated base station (wifi ? low energy bluetooth) deployed in buildings for precise positioning

The platform will host several applications. For instance, **geolocated tag**: allow to declare, tag and geolocalize anomalies in the port, in order to communicate on issues in real time. User experience: when a user see a problem (pollution, traffic) in part of the port, he can tag on the application the issue, and inform everyone Deployment on 1 port during the project

The value proposition of the solution is: **transparent solution**: combining different connectivity and geolocation means (terrestrial & satellite), providing transparent service for the users; **independent solution**, adaptable to any port context : the solution is not linked to a specific communication or positioning system, and can be plugged in any context.

A large range of potential services can to be hosted in the platform in the future: possibility to connect to external data, as weather data, traffic jam, alerts, events..., and added value applications to be developed during the project, but also after the project by the port operators

Key personnel

Marie DESPLAS (F) - System engineer in Earth Observation domain:

Marie has over 10 years' experience in system engineering. Graduated in 2009 from the ENSEEIHT, she has been working since then at Telespazio in France on satellite ground operations on various projects. She is now working since 2015 at Thales Alenia Space as a system engineer on architecture and operational concepts on several Earth Observation projects. She already manages and works on an European H2020 project, she has then background and experience on this European working context with multiple partners.

Stephanie AURIOL (F) - System engineer for ground segment programs in Earth Observation domain:

Stephanie has over 15 years' experience in space fields (observation and navigation). She holds an Engineering degree from INSA Toulouse, France. She has been working in Thales Alenia Space France as Specification and Verification Engineer, System Engineer and System Architect. She worked on diverse image processing projects and several Ground Segment programs in Earth Observation including different image product formats. She is responsible of a post processing image chain which allows to generate several product levels obtained from various input image data. She has then background and experience with multiple interfaces and image product formats.


Hugues SASSIER (M) - WEKEO DIAS platform technical manager:

Hugues has over 20 years' experience in Earth Observation system. He developed a strong expertise in applications and ground segment development through several projects: R&D studies, operational programs

and export systems. He is an expert in the following domains: ground segment architecture, SW development, web technologies, GIS, standards and interoperability. He was Thales Alenia Space representative to the Open Geospatial Consortium (OGC) as Technical committee member. He is the technical manager of the WEKEO DIAS platform since 2019 for its development with Eumetsat.
<p>Anne ROUANET-LABE (F) - System engineer in Bids & Advanced projects Navigation: Anne has 6 years' experience in GNSS & Internet of Things related activities. She was system performance responsible for the Performances of the Kineis constellation and drove the design and development of a system simulator for capacity analysis; She was technical responsible for Omnispace satellites, and now is in charge of constellations offers. In GNSS field, she developed a strong expertise in SBAS architecture, et especially safety assessment during its implication in the KASS program. She will be project manager for the project.</p>
<p>Hanaa AL BITAR (F) - System engineer in Bids & Advanced projects Navigation: Hanaa has 15 years' experience in GNSS related activities, among which 10 years responsibility in SBAS including: NLES definition and technical support, SBAS system studies, SBAS Payload definition in various SBAS service provision ITTs, Project and technical manager of E5b PPP testbeds 2015 and 2016. She will be technical responsible for the project.</p>
<p>Fabrice RIALET (M) - System engineer in Bids & Advanced projects Navigation, in charge of IoT & data collect export opportunities, manager of data collection activities within the Navigation Business segment: Fabrice having been in charge of Argos 4 payload development (2008/2012), he has taken the lead of all Data Collection activities in Navigation Domain, in particular: Satellite-AIS, VDES, and MEOSAR activities. He had formerly participated to many European Commission programs (for instance, LIAISON project, for demonstration of LBS service in Europe) and is in particular in charge of Thales Alenia Space contribution to SAT 406M project for GSA (Horizon 2020 Call 2013/2014). He will be the IoT & GNSS expert for the project.</p>
Relevant Projects
H2020 CANDELA 2017-2020 Copernicus Access Platform Intermediate Layers Small Scale Demonstrator. Technical Leader, Work Package Manager - http://candela-h2020.eu/
H2020 EVOLVE 2018-2021 - Large-scale testbed by integrating technology from HPC, Big Data and Cloud – Sentinel 2 Change Detection Usecase Leader https://www.evolve-h2020.eu/
Etude CNES « <i>SMAR</i> », phase A of a French program dedicated to maritime surveillance based on constellation 2009
Etude CNES « <i>SAMSON</i> », phase A+ of a French program for AIS satellite :2011
Etude CNES « <i>coût réduit</i> », phase A2+ of a French program for AIS satellite 2012
Etude ESA « <i>ESPAIS</i> », phase A of a European program dedicated to maritime surveillance based on constellation 2010
Etude EDA « <i>Globmarsit</i> », analysis of space concept for maritime surveillance, French + Norwegian 2010
Etude CNES « <i>R&T AIS</i> » : study on AIS processing and validation on real signals in 2010 and 2012
Projet FP7 European commission « <i>Seabilla</i> »: development of an end-to-end system AIS simulator, deployable for a maritime surveillance demonstration 2013
Projet FP7 European commission « <i>Dolphin</i> »: analysis of technics for data fusion of sat-AIS data, deployable for a maritime surveillance démonstration 2014

Projet ESA « <i>Data Processing Centre</i> » Artes 20: implementation of a first version of the european processing center of AIS 2012
Flamingo is an H2020 project aiming to developing promoting PPP within 5G networks. A trial involving terminals and infrastructure as well as key players like Google and uBlox will be implemented in a near future (2017-2018)
5G Champion is a H2020 project carried out in partnership between EU and Korea. The aim is to deploy a 5G infrastructure for the Olympic Games in Korea in 2018. One of the key aspects of the project is to meet the objective expressed at 3GPP level to provide a positioning technology meeting an accuracy of 1 meter everywhere. Thales Alenia Space is in charge of the development of such a technology based extensively on PPP introduced in 5G network. A real trial is being implemented first in Finland, and then in Korea (2016-2018)
The ELAASTIC project objectives were to develop an European-based, worldwide service to provide/enable location solutions for LBS and M2M applications, combining mature Assisted-GNSS and Wi-Fi-based location techniques together with features enables by European GNSS signal specificities. As part of the ELAASTIC project, TAS-F lead analysis and demonstration of CRPA antenna-based techniques to mitigate jamming and multipath effects over mass market products. It ended with a test campaign with CRPA antenna to mitigate jamming and multipath. (2014-2016)
<p>The liaison project was dedicated to the development of LBS solutions for critical applications: police, firebrigades, road charging, lonely Workers</p> <p>The Liaison project aimed at developing seamless and ubiquitous positioning techniques with 3G Terrestrial network, WIFI and UWB. Liaison developed the first 3G mobile phone running on Linux and implementing a full software GNSS receiver hybridized with OTDOA and WIFI TOA Ranging (2006-2009).</p>
<p>Kineis</p> <p>Thales Alenia Space is part of the consortium of the KINEIS IoT nanosatellite constellation. Thales Alenia Space is in charge of the system and constellation definition, the payload and the ground segment. The highlevel definition of the solution is included in following table</p>
<p>Omnispace newspace contract</p> <p>Thales Alenia Space is in charge of the design and to build an initial set of two satellites for operation in nongeostationary orbit (NGSO). These initial satellites will support 3GPP-defined Narrow-Band IoT radio interface and will serve to advance the development and implementation of Omnispace's global hybrid network. This project initiates the development of its new generation NGSO nanosatellite constellation which will operate in the S-band. This nanosatellite infrastructure allows to progress on the development of technology for the next generation of IOT solution.</p>
Relevant publications and products
WeKEO is the EU Copernicus DIAS reference service for environmental data, virtual processing environments and skilled user support. https://www.wekeo.eu/
DIAS MUNDI since 2018 – Catalogue Provider, Data Offer Responsible - https://mundiwebservices.com/
Geopositioning method with trust index, and associated terminal, Patent No. 20150268354, 5th June 2018,
Method for determining a confidence indicator relating to the trajectory followed by a moving object, Patent No. 20130207837, 7th March 2017,

Positioning System Using Pseudolites Operating In Assisted Mode, Patent No. 20130009815, 10th January, 2013.
Geopositioning method with trust index, and associated terminal, Patent No. 20150268354, 5th June 2018,
Method for determining a confidence indicator relating to the trajectory followed by a moving object, Patent No. 20130207837, 7th March 2017,
Positioning System Using Pseudolites Operating In Assisted Mode, Patent No. 20130009815, 10th January, 2013.
Infrastructures
WEkEO infrastructure on cloud https://www.wekeo.eu/
Thales Alenia Space gathers all the necessary technical tools and databases to perform the project and efficiently interact with the consortium members. No specific hardware is required for the foreseen tasks and Thales Alenia Space's experience in running international programs is a guarantee of success for these activities.

Three o'clock	
Description of the organisation	
<p>Three o'clock (3OC) is service design agency based in Paris (France). We believe that cities should be pleasant, safe, and fair for all, but they are not. More collaborative approaches need to be applied to reduce cities' complexities, reimagine its services (be it mobility, housing, education or health) and to tackle climate change and inequalities. From Paris to Shanghai, cities have the opportunity to play a central role in designing their future and bringing together public and private actors, breaking silos, and working towards shared outcomes and goals. And this is how Three o'clock was born. Three o'clock works with companies, public authorities and citizens to create or improve products and services that are user-oriented, provide new urban experiences, and make cities more livable.</p> <p>The agency is involved in three main sectors: urban mobility, energy and nature-based solutions. It offers the following services: Service design: We design value propositions, business models and user experiences based on user and market insights to boost market uptake or support scale up; Engagement: We develop strategic communication maps to engage with users through campaigns, outreach and awareness actions and maximize the reach of messages; Bootcamps: We design and facilitate workshops to help organisations ideate and create services.</p>	
Relevant skills/experience/technologies (at least 10 lines, in full text, no bullet points)	
<p>Three o'clock is a social enterprise. It co-invests in projects that believes in and does pro bono work for social entrepreneurs and communities who need the extra help.</p> <p>Three o'clock's approach is based on: Integrating human experience into urban projects; Testing & prototyping solutions in actual living environments; Empowering organisations through an experimental learning process that cultivates the <i>learning by doing</i> mindset.</p> <p>Three o'clock is interdisciplinary. With engineering, research, policy, business and communication backgrounds, it has the right mix of ingredients to work together with our partners and clients to design and launch the best people-centred concepts. The team has more than 10 years of experience with EU projects in the areas of business modelling and design, engagement, communications and event organisation.</p> <p>Website: http://threeoclock.co/</p>	
Role in the project	
<p>Three o'clock will lead the WP7 that aims at raising awareness, engaging communities and citizens, disseminating results, and building knowledge to boost the uptake of the solutions implemented in the project. For this, it will carry out research and study the main pain points and problems of citizens living close to the ports in the project. The output will be a prioritised map of existing problems linked to the ports' activity. It will be undertaken by 3OC and the 4 ports in the proposal. Co-design workshops will then be organised and facilitated by Three o'clock with the support of ports to integrate citizens' inputs into the innovation concepts and services that will be designed in WP1 and WP2. A number of feedback loops between the project and the citizens will allow to fully address their needs and create a participatory process that will engage these local communities and boost the acceptance of ports.</p> <p>The company will organize an online Portathon and support the winner(s) in taking a new solution to the market through various workshops to define their business model, value proposition, market etc. This event</p>	

will call for European startups, individuals, companies and/or organisations to submit innovative solutions and concepts to address a set of identified problems that are not addressed within the scope of the project. A final event will be organised during the last three months of the project to **disseminate the results of Greening Ports and the Master plan**. The event will take the form of a Bootcamp with interactive learning sessions, and knowledge and experience sharing sessions between the participants, with a view to build capacity and give the right tools to the right people to support them in making European ports greener. In addition, it will develop an effective Communication and Dissemination Strategy and Action Plan to inform and engage the project's target audiences and stakeholders, including communication campaigns. These multilingual targeted communication campaigns will raise the awareness of ports' challenges and ambitions to reduce GHG and pollutants emissions and become more inclusive will be rolled out. Demonstrating the positive impacts of Green Ports will be at the heart of the campaigns. They may take the form of success stories, factsheets, infographics, videos, interviews. Finally, Three o'clock will also contribute to WP1, as the partner in charge of **citizen engagement** in the Task Force and to act as a liaison to push citizens' inputs into the concepts and services that will be developed in the project.

Key personnel

Eva BOO (F) - Innovation Manager & Co founder:

Eva, Service design Specialist, has 12 years of experience in urban related projects in the mobility, energy and construction sectors working in different companies in Spain, France and the United States. During these years, she has led +100 assignments encompassing strategy, marketing, innovation management & design of new products & services and participated in more than 20 European projects under FP7 and H2020. Prior to founding Three o'clock, she worked 8 years at LGI Consulting, where she led the Strategy & Innovation business unit. Prior to LGI she worked for the Spanish Government in the US and at the engineering company Ayesa where she worked in the international business development department as an area manager for South America, Africa and Asia. Eva started her career at the US consulting company Accenture. Eva has an MSc in Industrial Engineering, majoring in construction and industrial systems from UPV (Spain) and ESTP (France) and a Master's in international business management and operations from ICEX (Spain & US). She is a certified LEGO Serious Play facilitator, in Business Model Innovation by Strategyzer and La Fresque du Climat (Climate Collage Association). She is an expert for Climate KIC (Energy & Mobility), EIT Urban Mobility.

Chloe CHAVARDES (F) - Engagement Manager & Co founder:

Chloe, Communication Specialist, is in charge of public communication and engagement activities at Three o'clock. She works closely with partners to define, coordinate and implement project communication strategies, plans and actions. Her areas of expertise are public engagement, awareness raising, outreach campaigns design and implementation, and event management. Prior to founding Three o'clock, she worked for more than 7 years at LGI Consulting, where she was involved in more than 30 EU projects under FP7 and H2020, responsible for Communication and Dissemination Work Packages and Tasks. She also spent 5 years in corporate communications at the European Space Agency in the Netherlands and France and has conducted communications research in the energy sector in the United States. Chloe is a certified LEGO Serious Play facilitator.

Esti SANVICENTE (F) - Research Design Manager & Co founder:

Esti focuses her work at the intersection of engineering with social sciences, with a particular focus on the sustainability of urban mobility and built environment. She has more than 10 years of experience in urban related projects and was involved in more than 12 European projects under H2020. Prior to founding Three o'clock, she worked for more than 3 years at LGI Consulting, where she assisted the Strategy & Innovation

business unit director. She also spent three years developing innovation projects at the Energy Cluster Association of the Basque Country in Spain. Esti started her career as researcher at the joint laboratory EDF R&D- “Bâtiments Haute Efficacité Énergétique” in Lyon (France) and at the University of New South Wales in Sydney (Australia). Esti holds a PhD in energy and environment and an MSc in Industrial Engineering, majoring in renewable energy systems. She is certified in Business Model Innovation by Strategyzer and La Fresque du Climat (The Climate Collage Association).

Relevant Projects

H2020 – Mobility – DREEM (2021 – 2023): The aim of the project is to co-design with users an innovative micromobility service with an adapted and well fitted user experience all along the trip process. The vehicle and the operational model will be tested in three pilot cases in a university (Goteborg), in a city (Torino), and in a company (Belgium). Three o'clock coordinates engagement activities in the three pilots sites and the people-centred approach to co design the service. Finally, 3OC will raise awareness and reinforce the community around sustainable mobility and organise a mobility innovation camp.

B2B – Open Data Challenge to ideate new services as a first step in their innovation journey (2020): The project aimed to design and organise an acceleration process for ideas inside a large engineering company. The challenge was focused on the open data topic. Our service consisted on preparing the materials for their 3 thematic areas (energy, smartcities and land use), designing & facilitating two dedicated workshops for 50 intrapreneurs, creating a Sprint Box to engage with participants and provide tools and resources to develop the best ideas and a coaching service to discuss specific issues and challenge ideas.

H2020 – Energy – ENTRUST (2015-2018): The project's main outcome was to provide a new understandings of energy related practices using an intersectional approach to the socio-demographic factors in energy use to enhance stakeholder engagement in Europe's energy transition. Eva Boo and Esti Sanvicente investigated new business models to support the innovative transition pathways proposed within ENTRUST. They also coordinated citizen engagement activities iin the Parisian community and co designed and developed WE.ACTUM, an open platform dedicated to the co-creation of energy policies. The project had a budget of 3.49M€ with 7 partners.

Femmes en Mouvement : [Femmes en mouvement](https://femmesenmouvement.fr/) brings together women professionals and experts from the mobility and transport industry in France. One of the objectives of the organisation is to address gender perspective in mobility policies and the empowerment of women in the transport sector. Threeo'clock is part of the board of directors. <https://femmesenmouvement.fr/>

Comité Paris Center: This committee is composed of experts and citizens with the aim of studying and shedding light on the operational implementation of mobility projects in the center of Paris. Threeo'clock is part of this participatory process as expert in the area.

Relevant publications and products

Lennon, B., Dunphy, N.P. & Sanvicente, E. Community acceptability and the energy transition: a citizens' perspective. *Energ Sustain Soc* 9, 35 (2019). <https://doi.org/10.1186/s13705-019-0218-z>


Boo, E. et al. (2014) “How Innovative Business Models Can Boost The Energy Efficient Buildings Market”, 40th IAHS World Congress on Housing - Sustainable Housing Construction, December 2014.

Dunphy, N., Boo, E., Dallamaggiore, E., Morrissey, J. (2014) “Developing A Sustainable Housing Marketplace: New Business Models To Optimise Value Generation From Retrofit”.


AZKARGA: “MADE IN EUSKADI” FAST CHARGING POINTS FOR ELECTRIC CARS - FuturEnergy - Special Edition (2015)

Sanvicente, Estibaliz & Giroux, Stéphanie & Ménézo, Christophe & Bouia, H.. (2013). Transitional natural convection flow and heat transfer in an open channel. *International Journal of Thermal Sciences*. 63. 87–104. 10.1016/j.ijthermalsci.2012.07.004.

Lau, Ghar & Sanvicente, Estibaliz & Yeoh, Guan & Timchenko, Victoria & Fossa, Marco & Ménézo, Christophe & Giroux, Stéphanie. (2012). Modelling of natural convection in vertical and tilted photovoltaic application. *Energy and Buildings*. 55. 810–822. 10.1016/j.enbuild.2012.10.014.

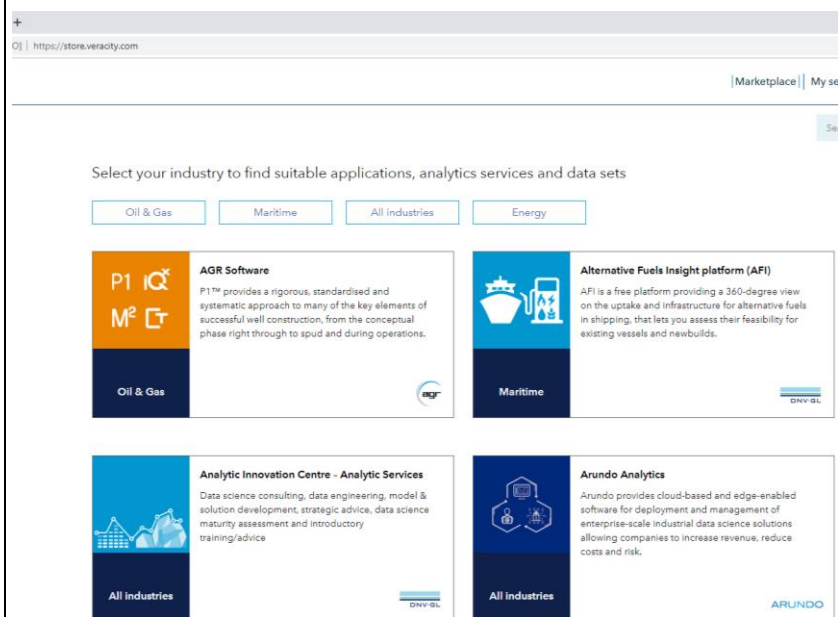
Capgemini Consulting - Invent	
Description of the organisation	
<p>As the digital innovation, consulting and transformation brand of the Capgemini Group, Capgemini Invent helps CxOs envision and build what's next for their organizations. Located in more than 30 offices and 23 creative studios around the world, its 6,000+ strong team combines strategy, technology, data science and creative design with deep industry expertise and insights, to develop new digital solutions and business models of the future. Capgemini Invent is an integral part of Capgemini, a global leader in consulting, technology services and digital transformation. Capgemini Invent combines the multi-disciplinary strengths of Capgemini Consulting and key expertise in technology and data science from the rest of the Group. It also incorporates the strategic acquisitions of customer engagement firm LiquidHub, innovation consultancy Fahrenheit 212, and the creative design agencies Idean, Adaptive Lab, and Backelite. Most recently this includes the integration of the communication agency June21st, the energy & utilities consulting house, KONEXUS Consulting and a big move in the social impact domain with the acquisition of Purpose, an agency that comes to support our Invent for Society, sustainability, and marketing propositions. Capgemini announces in 2020 its ambition to become net zero business by 2030.</p>	
Relevant skills/experience/technologies	
<p>Capgemini Invent has teams of 100+ consultants and recognized experts specializing in energy transition, low carbon roadmap strategies and support for the impacts of the climate change. It also has more than 200 data engineers / scientists at the forefront of data science and artificial intelligence. Invent is present in 16 European countries and work with stakeholders in the port and maritime sectors. Invent supports stakeholders both in public (port authority, customs, representative of the State, etc.) and private (shipowners, logisticians, carriers) in their energy and digital transition strategy. It finally supports public bodies (ministries, European Commission, European data portal) and private industrial stakeholders (Airbus, Schneider, Orange, etc.).</p>	
Role in the project	
<p>Capgemini Invent is the leader of the WP1 – Green Port Modelling and will support the ports and their partners to build a common vision to achieve decarbonization. We will also contribute to build the Master Plan leveraging the experience from the different services deployed and recommendations on the economic, legal and financial aspect.</p>	
Key personnel	
<p>Marianne BOUST (F) – Director: Marianne has over 10 years of work experience dedicated to energy transition. She provides expertise in the areas of renewables, battery, hydrogen and utilities strategy. She mainly works on growth strategy design, new business model, digital and innovation to accelerate the decarbonization. She's a regular speaker at industry conferences (Solar Power Europe, France Energie Eolienne...) and publishes point of views on major trends. Prior joining Capgemini Invent Marianne worked as a principal analyst at IHS Markit.</p>	
<p>Richard BIAGIONI (M) - Vice-President: Richard has extensive experience in the field of innovative Research & Development as well as working in public-private partnerships. Before joining Capgemini Invent, Richard was CEO of InnoEnergy France, a venture fund dedicated to energy transition and funded under Horizon 2020. Between 2009 and 2013 he</p>	

<p>was the Managing Director of the National Competitiveness Cluster for Risk Management in Aix-en-Provence, France. The Cluster gathers 232 members, including SMEs, industries, research laboratories, universities and end-users, and financed 105 projects, which represented €229M of R&D. As the objective of the Cluster was to foster innovation through identification and funding of innovative R&D projects, Richard gained specialist insights into the French innovation ecosystem. Previously, Richard held a few other posts, including Director of a training centre for industrial risks; Head of Information Technology Strategy Unit, followed by Head of the International Cooperation and European Affairs Department at the Port of Marseille Authority; and Lecturer, Researcher and Course Manager for the Journalism High School of Marseille. He is also a passionate entrepreneur, creating a .com start-up. Richard holds a degree in Multimedia Design from the University of Provence, France.</p>
<p>Relevant Projects</p>
<p>Europorte : Green & Digital Strategy for a major player in the rail sector present in most of the major French ports. https://www.europorte.com/en/our-commitments/our-csr-credentials/</p>
<p>GPM La Rochelle : Green & Digital Strategy for the maritime port of La Rochelle https://www.larochelle.port.fr/gouvernance/projet-strategique/</p>
<p>French Customs : Preparing French Ports & Customs to cross Brexit as smoothly as possible https://www.douane.gouv.fr/sites/default/files/uploads/files/Brexit/Other_languages/Preparing-for-Brexit-customs-guidelines-12.11.20.pdf Video French Port & Smart Border : https://www.youtube.com/watch?v=SGCgm7yWKoI</p>
<p>Airbus : Definition of the European aeronautics leader's 2030 climate roadmap https://www.airbus.com/company/sustainability/environment/decarbonisation.html</p>
<p>ADP Airport : Accompanying of the ADP Group in its 100% renewable electricity supply https://www.actu-environnement.com/ae/news/aeroport-paris-signature-ppa-urbasolar-gazelenergie-34946.php4</p>
<p>Relevant publications and products</p>
<p>World Energy Markets Observatory – 22nd edition in 2020 https://www.capgemini.com/research/22nd-edition-world-energy-markets-observatory/</p>
<p>Fit for Net-Zero study - 55 Tech Quests to accelerate Europe's recovery and pave the way to climate neutrality. https://www.capgemini.com/resources/investments-in-next-generation-clean-technologies/</p>
<p>RE100: how do companies stand out from their peers https://www.capgemini.com/resources/making-business-sense-how-re100-companies-have-an-edge-on-the-peers/</p>
<p>RATP - Help the Paris metro company to choose its renewable energy suppliers: https://www.ratp.fr/groupe-ratp/newsroom/developpement-durable/electricite-verte-la-ratp-lance-une-reflexion-pour</p>
<p>Scaling up innovation in Energy Union Capgemini and i24c report https://www.capgemini.com/fr-fr/ressources/scaling-up-innovation-in-energy-union-capgemini-and-i24c-report-2/</p>

DNV GL	
Description of the organisation	
<p>DNV GL ITALY is a legal entity with a sole shareholder, DNV GL AS; DNV GL organization is a group of companies which belongs to a Norwegian foundation. This guarantee the full independency of the organization from any shareholder's interest. DNV GL is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. DNV GL provides classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, DNV GL experts are dedicated to helping customers make the world safer, smarter and greener.</p>	
Relevant skills/experience/technologies	
<p>DNV GL is the first worldwide shipping register and is the leading technical advisor for marine operation with its department Noble Denton Marine Services. DNV GL is also the producers of international standards, DNV GL codes, whirly used in maritime & energy sectors.</p> <p>DNV GL provides consistent, integrated services within technical and marine assurance and advisory, risk management and offshore classification, to enable safe, reliable and enhanced performance in projects and operations. Together with our partners, we drive the industry forward by developing best practices and standards. Its people combine industry expertise, multi-disciplinary skills and innovation to solve complex challenges for our customers. Its research department set-up the status-of-art of several design practices, i.e. marine cybernetics and digitalization, worldwide working on autonomous navigation topics since more than 5 years.</p>	
Role in the project	
<p>Within Greening ports project, DNV GL will contribute in assess the national and international applicable code and standard to provide a comprehensive legal framework and defining best practices which could take to specific recommendation to be possibly included into a typical DNV GL standard as a Recommended Practices.</p> <p>Once defined the legal framework, identification on major risks and mitigation solutions could be analysed and assessed with an independent approach typical for a Third Party Authority. DNV GL is also often involved in critical assessment of project sustainability and this could be an additional value that could take to the project consortium.</p>	
Key personnel	
<p>Andrea SPESSA (M) - Oil&Gas at DNV GL - Sustainability Advisory:</p> <p>With 30 year of experience in oil&gas field, Andrea Spessa worked both in offshore and onshore projects, for platforms, pipelines, LNG and power & petrochemical plants. He started my career in Agip (Eni) where has been working for 10 years involved from feasibility studies to execution projects for offshore installations. As project manager, he followed the development of Sabratha complex, offshore Lybia, during FEED phase. He then joined Edison where he worked on Adriatic LNG project to move later to an EPC contractor in Milano, initially as technical manager and later as managing director where he was involved in the follow-up of several projects worldwide. Since 2015 he joined DNV GL as Area Manager for Mediterranean Sea.</p>	


<p>Bartłomiej ZYGMUNT KOŁOSOWSKI (M) - Head of Noble Denton marine services, Italy and MED at DNV GL:</p> <p>Bartłomiej started his as Marine surveyor in 2003; he had long assignments in Germany, Netherlands, Belgium, Italy and China, and on shorter assignments in France, Denmark, Poland and Norway. He gained a specific harbor experience with the Port of Rotterdam where carried out several surveys and followed marine operations, including port navigation and loading / unloading of cargos. He studied at Universities in Europe (the Netherlands, Italy and Germany), Asia (Hong Kong) and Africa (Johannesburg), graduated MBA and MSc Naval Architecture.</p>
<p>Riccardo CASTIGLIONI (M) - Naval Architect and Marine Engineer:</p> <p>Riccardo joined DNV GL as Marine Operations engineer after a master in Naval Architecture in Genova University. In almost 5 years he worked in design review as well as surveyor on major international projects as TAP, Absheron and IGI Poseidon. Riccardo has a deep knowledge of all typical shipping problems and he developed some economical models for LNG bunkering in port facilities and near shore.</p>
<p>Relevant Projects</p>
<p>As first worldwide shipping register, DNV GL has data related to most of the shipping fleets, either cruise sector and commercial shipping.</p>
<p>DNV GL has been working on several harbor feasibility study as well as has been involved in the follow-up of terminals and marine facilities in Due Diligences or independent verification body</p>
<p>Drawing on our more than 150 years of experience in shipping identifying risk and working with improving safety, DNV GL supports owners, insurances and authorities. Its expertise and global reach covers the entire maritime value chain from project initiation to decommissioning.</p>
<p>Relevant publications and products</p>
<p>DNV GL Report, “Ports, Green Gateways to Europe”, July 2020 (https://www.dnvgl.com/publications/ports-green-gateways-to-europe-179372)</p>
<p>DNV GL Position paper, “Remote-controlled and autonomous ships”, Edition 2018 (https://www.dnvgl.com/maritime/publications/remote-controlled-autonomous-ships-paper-download.html)</p>
<p>Synergi™ Software Package – DNV GL Commercial Software for Asset & Barriers’ Management (https://www.dnvgl.com/software/products/synergi-products.html)</p>
<p>Navigator Port™ software – DNV GL Commercial Software to supports compliance for harbour management (https://www.dnvgl.com/services/navigator-port-modules-1463)</p>
<p>DNV GL class guideline, DNVGL-CG-0264, “Autonomous and remotely operated ships”, Edition August 2018 (https://www.dnvgl.com/maritime/autonomous-remotely-operated-ships/class-guideline.html)</p>
<p>DNV GL code, DNVGL-OS-A101, “Safety principles and arrangements”, Edition July 2019</p>
<p>DNV GL code, DNVGL-RP-G105, “Development and operation of liquefied natural gas bunkering facilities”, Edition September 2019 (https://oilgas.standards.dnvgl.com/download/dnvgl-rp-g105-development-and-operation-of-liquefied-natural-gas-bunkering-facilities)</p>
<p>Infrastructures</p>
<p>Veracity is a marketplace for DNV GL to deliver its digital services, tools and apps. It is a platform, where also other qualified developers and suppliers of digital services and analytics can develop and market their services, applications and insights.</p>

On the platform's marketplace, asset owners can subscribe to industrial applications and data analytics services that can help them make better use of data to optimize their safety and performance. These applications will be provided not only by DNV GL, but by a host of other qualified providers of data, data analytics and digital solutions.



Main Innovations to be conducted in the course of project (Envisaged Progress):


The Greening ports project foresees to define new standards for green ports. DNV GL shall take a RP or a guideline on this project.

GEOSYSTEMS HELLAS S.A. [GSH] – GEOSYSTEMS HELLAS IT KAI EFARMOGESGEOPLIROFORIAKON SYSTIMATON ANONIMIETAIREIA	
Description of the organisation	
<p>GEOSYSTEMS HELLAS S.A. – GSH, is an ambitious SME focused on the development Earth Observation Monitoring Solutions, www.geosystems-hellas.gr.</p> <p>GEOSYSTEMS HELLAS S.A. – GSH, was established in November 2009 as the newest member of GEOSYSTEMS EU GROUP (www.geosystems-group.eu). Is a Greek SME with 9 high skilled engineers in the core team and a network of professionals engaged time by time on a project basis. [GSH] has three main activities: acting commercially as Hexagon Geospatial and Hexagon Airborne Solutions authorized reseller and as consultant in Greece and Cyprus on subjects of Photogrammetrical, Remote Sensing, Geodetic and Environmental Monitoring projects working also with Big Data. GSH is focused on industrial projects covering added value services in the space market including Earth Observation and Navigation Applications, business development and Project Management support; participating in service projects, Enterprise Solutions /Smart M.Apps, Smart Cities /IoT Technology Trends and participating in R&D projects based on the above expertise.</p> <p>GSH is working on commercial Environmental, Photogrammetrical, Remote Sensing projects and R&D projects for land management, crisis management and Spatial Data Infrastructure (INSPIRE Directive) implementations. [GSH] is deeply involved in Big Data and Data Fusion and machine learning/deep learning techniques for European and National projects in Greece and establishment of infrastructure for spatial information (Metadata, Data Specifications, Data and Service Sharing and Monitoring and Reporting). Additionally, holds extensive expertise in regard to operational requirements/scenarios definition in fields of data exchange/sharing in an interoperability manner.</p> <p>GSH is a member of European Association of Remote Sensing Companies (EARSC), Hellenic Association of Space Industries (HASI) and a funded member of si-cluster since 2014.</p> <p>GSH has an ISO certificate ISO 9001:2015 covering the products and services under the field of expertise, Core Business/ Expertise: Remote Sensing and photogrammetry applications providing high level engineering and management consultancy in the space sector; big Data, Data Fusion and Data Analytics techniques, Engineering and Analysis as well as System and Software Engineering; Airborne Lidar 3D monitoring techniques and applications, sensor calibration services; Smart/Safe cities; Blue / Green Growth; monitoring and applications; GIS/WebGIS.</p>	
Relevant skills/experience/technologies	
<p>GSH is a leading National provider of information technologies from 2009, that drive productivity and quality across geospatial and industrial enterprise applications. After 2014, operates globally in high-value, high technology areas focusing on helping clients to exploit new technologies and management styles. Its proven expertise has been gained from performing a broad range of projects. The solutions integrate sensors, software, domain knowledge and customer workflows into intelligent information ecosystems that deliver actionable information used in a broad range of vital industries. The patterns of change shaping our world are so powerful that their implications go far beyond anything remotely similar in our past. Strengths in image exploitation, processing, visualization and geospatial data management to meet a broader spectrum of customer needs in today's enterprise environment.</p>	

Role in the project
<p>GSH team is committed to moving business and industry beyond predicting, preparing and adapting to influence the present and affect the future, and ultimately, narrow the chasm between what is and what should be. “We call this shape of progress. The shape of things to come”. The user (port) is the challenge. Challenge is translation of user’s requirements into green technology. [GSH] team is committed to moving business and industry beyond predicting, preparing and adapting – to influence the present and affect the future, and ultimately, narrow the chasm between what is and what should be a green port. We call this shape of progress.” The shape of things to come”. With the company expertise in This is the initial point for the GSH team participation to the «GREENING PORTS». Based on the company expertise, our team plan to be Leading WP5 for Cooperation Replicability -Cooperation activities and also have Contribution in WP1 tasks for blue green growth, circular economy, NBS, Contribution in WP 2 tasks Green Smart Logistics & Port Digital activities, Contribution in WP 3 task Port Service prototyping, Contribution in WP4 Green Port Dashboard (design to Operations) tasks, Contribution in WP 6 task for the master plan and Contribution in WP 7 tasks communication – dissemination.</p>
Key personnel
<p>Vasiliki (Betty) CHARALAMPOPOULOU (F) – CEO: Vasiliki is a geologist, with a specialization on remote sensing, photogrammetry and GIS applications. In 1992, she graduated from the National and Kapodistrian University of Athens and since then, she has been working on research projects in the area of photogrammetry, Earth observation and geoinformatics. She is actively enrolled in projects by ESA, EARSCE and the GEO. Since 2011, she is the CEO of Geosystems Hellas S.A., providing consulting, solutions and services on GIS and WebGIS, photogrammetry and Earth observation applications. As CEO and President, she has established methodologies and formulated strategies, gaining many distributions and collaborations. She has also I established several international collaborations with CNR, ESA, NASA, ISA, UNESCO, FIG, OGC, etc. and several international universities, local governments and industries, under the framework of collaborative H2020 and Interreg calls participation. In 2012, she established the company R & D division and had Successful R & D projects under her supervision, with transferability to many industries and countries. She is also responsible for the distribution of roles and responsibilities in the company.</p>
<p>Christos KONTOPOULOS (M) - Member of the board of directors, acting also as Technical Director: Christos has received his degree by the school of Rural & Surveying Engineering of the National and Technical University of Athens (NTUA). His main research interests and areas of specialization lie in the fields of GIS, remote sensing, photogrammetry and geospatial data analysis. He has been enrolled in several research projects and research teams, in the fields of Big Data and Data Fusion, Machine Learning and Deep Learning for Earth Observation, WebGIS and geospatial data analysis while also presenting a great experience on photogrammetric, LIDAR data analyzing, cadastre and satellite data exploitation projects. He has also been involved in several other commercial projects acting as a remote sensing and photogrammetry specialist, dealing with the processing and the analysis of multispectral and hyperspectral optical data, UAV data as well as LIDAR and SAR data.</p>
<p>Yannis PARASKEVOPOULO (M) - Surveyor Engineer: Yannis working with GSH since 2019. Has a diploma from the National Technical University of Athens (NTUA), Greece and a MSc in “Urban & Regional Planning” in NTUA. Since September 2018 is also a PhD candidate in the Geography and Spatial Analysis Lab of NTUA and his research is focused on analytical tools for evidence-based urban planning with emphasis on how urban morphology, street centrality (space syntax analysis) and functional mix (land-use distribution) can be integrated into a decision support system towards human-centred urban planning. He has significant working experience as a GIS Specialist and has</p>


<p>participated in research projects and studies relevant to urban planning and sustainable urban mobility and since his graduation (October 2017), he has published numerous peer-reviewed papers in scientific conferences in Greece and abroad. His research interests include advanced spatial analysis, spatial statistics, space syntax analysis, urban morphology, accessibility, sustainable urban mobility and evidence-based urban planning. Is involved in Big Data and Data Fusion and machine learning/deep learning techniques projects of GSH.</p>
<p>Maria CHALAKATEVAKI (F) - Civil Engineer.: Maria has a diploma from the National Technical University of Athens (NTUA) and a MSc in Energy Production and Management from NTUA. She is holding also a Mphil from Cambridge Univesrity from the Department of Civil Engineering where she is also a PhD candidate. Her working experience started early on during her undergraduate studies working with PEARLS https://pearlsproject.org/ project and also contributing in new proposals writing.</p>
<p>Ioannis MAROUFIDIS (M) - Electrical And Computer Engineer: Ioannis working with GSH since 2020. Has a diploma from the National Technical University of Athens with a Diploma Thesis: Detection and Segmentation of Aerosol Layers & Clouds in Atmospheric Lidar Measurements. Specialization in Big Data and Data Fusion, Machine Learning and Deep Learning, Signal Processing and Computer Vision.</p>
<p>Maria BELLOU (F) - Surveyor Engineer: Maria working with GSH since 2020. She has graduated from the school of Rural and Surveying Engineering of National Technical University of Athens (NTUA), Greece, since 2017, and also holds a MSc in “Geoinformatics”, from NTUA, since 2020. Her main interests and areas of specialization are about geographic information systems, spatial analysis, mapping and remote sensing. Has an expertise in spatial data-bases, WebGIS and geospatial data analysis. Has participated in the European Program «Horizon TraSaCu – Traffic, Safety, Culture», under the Sustainable Mobility Unit of the National Technical University of Athens (NTUA and contributed in the design of the Field Work: Collection of data about drivers’ behavior and transportation choices.</p>
<p>Relevant Projects</p>
<p>Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens euPOLIS, (GA-869448) – H2020: On going project under the imitative of Climate action, environment, resource efficiency and raw materials. To systematically implement an innovative NBS-based urban planning methodology, based on the Blue Green Solutions (BGS) paradigm, which is designed to create spatial and functional conditions that will enhance not only the PH and WB of citizens, but also the urban metabolism, the social cohesion and the resilience of cities to Climate Change (CC) and natural disasters, http://eupolis-project.eu/.</p>
<p>Next-Generation Dynamic Digital EPCs for Enhanced Quality and User Awareness -D²EPC (GA-892984)– H2020: On going project under the imitative of Next-generation of Energy Performance Assessment & Certification focusing on the the geolocation of the buildings and their energy consumption and the he BIM-oriented and digital twin-enabled approach s, with the addition of multiple indicators, related to the smartness of the buildings (SRI), its environmental (LCA) and financial (LCC) performance, as well as to human comfort aspects, https://www.d2epc.eu/en.</p>
<p>BLENDED – ESA Contract: Synergetic use of Blockchain and Deep Learning for Space Data using NASA and ESA archives for urban cities expansion. BLENDED focuses upon Urban Expansion monitoring for three European Cities with the usage of timeseries Multispectral and SAR data in a three-decade</p>

lifespan. Deep Learning Networks are deployed for timeseries change detection analysis, while all platform data transfer and processes are implemented via a blockchain de-centralized manner.
EPIPELAGIC: Greece-China collaboration / ongoing project: The Expert Integrated support system for coastal mixed urban – industrial – critical infrastructure monitoring using Combined technologies - EPIPELAGIC project focuses on coastal area monitoring and addresses RIS3 priority for “Center of excellence for environmental studies-Environment & Sustainable Growth because of the Climate Change”. The main objective is to contribute to “mitigation and adaptation to climate change and natural disasters” by providing methodologies and tools using time series of Chinese Satellites (optical, SAR, Geodetical/ GPS-GNSS) in combination with European Satellite data and auxiliary data, https://epipelagicproject.com/the-program/ .
5DMUPLIS : 5 Dimensional Multi-Purpose Land Information System (5DMUPLIS)- National funding scheme/Bilateral collaboration Greece – Israel, completed research project 2016, 3 D urban area changes, 4d on time and 5D using several data bases input for sustainable cities, different components of the Earth system and human activities, real estate market facilitation- solution hosted by eoMALL), www.5DMUPLIS.gr .
Relevant publications and products
5DMuPLIS Solution: Timestamping Receipt for Copyright Num. #DEP636004570144813318 - Copyright.co.uk Signature (link)
https://www.dropbox.com/sh/fbvizmegrlyfjo1/AABiKZ-cSjN0M4rmK2tr2CZ8a?dl=0
Infrastructures
Software packages and libraries: 2 servers with Web-GIS software (ERDAS Apollo Professional, Smart Client, WebMap), 4 workstations & 4 laptops with GIS, Photogrammetry & Remote Sensing (ERDAS Imagine, Radar Suite & GeoMedia και Photogrammetry Suite and add ons), T300 GNSS rover/receiver/controller (GPS+GLONASS, B&R - internal Rx&Tx), SurvCE software, add on GNSS Beidou Option, a GPS base station for EGNOS/Galileo/Beidou in the office roof terrace in the centre of Athens. Development Software environments available.

Capgemini DEMS France	
Description of the organisation	
<p>Capgemini's Digital Engineering and Manufacturing Services (DEMS) France brings together deep domain expertise in engineering and manufacturing to boost our clients' competitiveness. Our solutions drive the convergence of physical and the digital worlds and build intelligent connections between machines, products, people, and suppliers that drive rich customer value through reduced time-to-market, mass customization, product innovation, end-to-end industrial efficiency and enhanced customer service to improve profitability and competitive agility.</p> <p>Our capabilities in Europe are managed through 3 Business Lines: Physical Engineering, Systems & Digital Engineering, Industrial System & Software. This organisation is completed by a dedicated Research & Innovation Department in charge of implementing our own innovation policy for the various industrial sectors for which we operate.</p>	
Relevant skills/experience/technologies	
<p>Digital Manufacturing services</p> <p>Our Digital Manufacturing services focus on leveraging the power of digital technologies to reshape the manufacturing landscape. We help clients leverage digital platforms to increase collaboration and provide insights across the product lifecycle and across the engineering to manufacturing value chain.</p> <p>At Capgemini, we help in improving the digital maturity of core manufacturing functions and work with our clients to adopt exponential technologies and industrial cybersecurity that can turn manufacturing efficiencies into a sustainable competitive advantage</p> <p>Simulation aided optimization for Industrial Performance Services</p> <p>Capgemini DEMS can rely on a pool of experts able to manage manufacturing & industrial flows while providing decision helping tools.</p> <p>Smart Energy Management Services</p> <p>Capgemini DEMS proposes secured, scalable and ready-to-use solutions that accelerate transition towards cost-effective and optimized energy performance. By leveraging data intelligence, we set up flexible and ergonomic digital platform enhancing massive acquisition and advanced data processing services to provide efficient energy management and impacting actions. Our solutions can meet the strategic and operational objectives of energy players as well as real estate managers (building, housing, plant) by addressing all kind of fluids (electricity, gas, water, air) and dealing with short term savings as well as mastering transition plan for environmental regulations compliance.</p>	
Role in the project	
<p>Within Greening ports project, Capgemini DEMS will contribute on two main topics:</p> <ol style="list-style-type: none"> 1. Simulation and optimization of port logistics operations (WP2). Based on flow modelling and simulation-aided optimization, we will elaborate the optimal organizational pattern using real data of a subset of a real port (Gdynia or Strasbourg), considering exploitation strategies, Resource sizing impact on environmental and performance, scheduling rules and synchro-modal principles recommendations. We will also be in charge of delivering a Decision Support System (DSS) tool 	

<p>using real data of a subset of a real port to connect micro & macro models & collect data from a set of monitoring systems, select relevant strategies / management rules in web browser GUI, optimize and display performance and environmental indicators</p> <p>2. Green ports energy simulation, monitoring and analysis (WP2 and WP4). Our role is to identify, collect and manage data from all energy consumers to measure impact of the greening ports transformation and to provide port authorities with decision-making support for services enhancement. Capgemini will develop connectors/API to compile existing in-service data into a powerful cloud platform used to monitor all information.</p>
<p>Key personnel</p>
<p>Yoann TREGOUET (M), Graduated from ECAM engineering school with a specialization in mechanics manufacturing, Yoann has worked during 10 years as a consultant for Airbus and Dassault Aviation, in Turbojet engine design definition, Maintainability studies and operational Maintenance activities. Since more than 3 years, he has joined the digital journey by managing Predictive Maintenance projects. Yoann joined Capgemini to take the lead of Predictive Operations and IoT business group to develop end-to-end solutions and propose his customers to optimize the business value of their data. Yoann proposes his activities to customers from various sectors like Energy (Total, GRDF, Terna), Aeronautics & Defence (Airbus, Nexter), Public sector (Nice Métropole), LifeScience (Bayer) or Telecom (DCC).</p>
<p>Eric CHAMBON (M): Graduated from ISAE – Sup'Aéro (French Institute for Space & Aeronautics) Toulouse (France) in 1988, Eric Started as an engineer at Airbus (former Aérospatiale Missile) before joining BOSSARD Group as a manufacturing consultant. Eric had several positions as a digital Manufacturing managing consultant at MDTVision (IBM group) and Dassault Systèmes, before joining Capgemini as Principal Consultant.</p> <p>Eric gets a wide experience in Manufacturing, Industrial and logistic performance, Digital Manufacturing and flow simulation. He is leading the Flow-simulation practice at Capgemini DEMS, and deployed simulation-based approaches for industrial performance in all industrial sectors, especially Aeronautics & Defense (Airbus, Dassault Aviation, Stelia, Nava Group...), Energy (Orano, Framatome, CEA), CPG, Retail or Lifescience.</p>
<p>Pierre-André VANDELLE (M), Graduated from IMT Mines d'Albi (France) in 2011. He started his career at ALTEN working on Airbus Aircraft projects as system engineer to control & manage obsolescence on Engineering Systems Tools Portfolio and converge towards harmonized and integrated solutions to achieve long lifecycle support. Since 2015 he has been leader of multiple Model Based System Engineering projects. Pierre-André joined Capgemini in 2019. He is leading the system engineering and MBSE practice. His role is to build our service portfolio, propose end to end solution to our clients and partners and support projects with his expertise. He was certified as SAFe Practitioner to lead Agile SAFe train in 2018.</p>
<p>Relevant Projects</p>
<p>Terminal de Contenidors de Barcelona (TCB) - Optimize Port Logistics with the support of flow simulation</p> <p>Context and goals: In the context of a new port terminal building, the Capgemini DEMS engineering team defined an architecture and a containers flow management organization. The goals of the study were to chose and size the appropriate equipment (handling & Storage), define Storage & handling strategy and management rules; target the maximum daily capacity, decrease non-value-added tasks.</p>

<p>Solution: Building of a shared application which allows to evaluate different storage strategies, simulation used as discussion and reflection medium with various equipment suppliers, iterative approach to refine operating rules.</p>
<p>Baker Hughes, a GE company (BHGE) – A fully digitized factory with Industrial Internet of Things (IIoT) solution</p> <p>Context: BHGE wanted greater visibility into its manufacturing processes as well as the ability to manage production in real time</p> <p>Solution: By partnering with Capgemini, BHGE implemented an industrial internet solution that gathers data from all manufacturing devices and machines to provide operators and engineers with a new level of insight and the ability to adjust production at a moment's notice</p> <p>Benefits: enhanced visibility and insight, real-time management of manufacturing processes provides nearly 50 users with real-time status updates, analysis of historical data, and visual metrics dashboards, prevention of 26,000 hours of downtime in 2017 (across all BHGE's plants in Italy), 12% increase in machine utilization five months after the deployment of the solution</p>
<p>Metropole de Bordeaux - Integrate an Energy Management System into a Smart City Program</p> <p>Context: Global perimeter of Bordeaux metropole facilities is increasing. There is a lack of visibility on the amount of energy expenses and consumption with limited capabilities to measure the returns of the city investments in energy efficiency improvement actions and works.</p> <p>Solution: Capgemini define and integrate a live data feeding process for 4.000 sites managed by the metropolis and the entire public lighting network. All energies and utilities are centrally monitored into a single platform allowing a real time monitoring of 250 energy intensive equipment, dedicated dashboards to report on the evolution of number of equivalent tons of CO2 emitted by the City, automated processing to validate or disable payment processes in case of invoicing errors</p>
<p>SE & MBSE to ease complex systems development</p> <p>Tanker: Application of Virtual System Engineering concepts from Mission Requirements to Digital Twin realization</p> <p>System of System: requirements management: from Mission definition to requirements traceability; architecture definition: Reuse of existing architecture & FLP architecture definition; modeling & Simulation: Behavioral modeling (Dymola, DBM) and control for systems.</p> <p>Systems architecture definition: Requirement's refinement, reuse & FLP architecture definition; modeling & Simulation: Behavioral modeling (Dymola, DBM) for water ballasts; hardware in the loop: Interfacing through UDP protocol existing hardware control panel.</p>
<p>Infrastructures</p>
<p>Softwares for port logistic simulation and optimization : Siemens Tecnomatix, AnyLogic, Witness14</p> <p>Energisme Plateform : a powerful cloud platform designed to manage massive and heterogeneous data that come together with smart analytics and services to enable efficient management and impacting actions.</p>

Altran Technology & Engineering Center	
Description of the organisation	
<p>Altran Technology & Engineering Center (Altran TEC) is part of Altran Technologies SAS, an international group offering innovation and high-tech engineering consulting. Altran's mission, operating in 35 countries, is to assist its clients in their global projects to create and develop new products and services. Altran has been providing its cutting-edge technology expertise for over thirty years to key players in various sectors, including the Aeronautics, Automotive, Space, Defense, Naval, Railway, Energy, Infrastructure & Transport, as well as Telecommunication, among others.</p> <p>Altran Technology & Engineering Center in Toulouse is an engineering delivery factory of 1900 engineers and researchers. It has a dedicated mission to accompany its clients into a successful transformation on every link in the value chain of their project, from conception to industrialization whereas R&I activities make part of the core business of the company. Altran TEC brings together the best engineers around specific know-how and business skills in order to maintain sectorial expertise on the industry and the business of Altran's clients. The company's cutting-edge technology expertise and innovative business models refer to: Experience Design, Analytics & AI, Innovative Product Development, Cybersecurity, Disruptive Software Products, IoT & Edge Computing, Advanced Networks, Advanced Manufacturing, Software Frameworks as well as Compliance & Performance.</p>	
Relevant skills/experience/technologies	
<p>Advanced Fluids and Thermal Expertise Centre is supported by 120 engineers, including more than 30 PhD holders and covers a wide range of activities within thermo-fluidic design and modelling of structures and systems, for transportation, industry or energy field including R&I phases, product development and validation and in service support. The whole spectrum of numerical approaches is proposed from nodal modelling up to high fidelity simulations addressing all specialities of the thermal field (conduction, radiation), fluidic domain (aerodynamics, hydrodynamics) and complex flows (multiphase, reaction, ...).</p> <p>Altran Quality, Manufacturing & Industrial Installations: Some 400 consultants, engineers and project managers support industries to tackle their Quality, Manufacturing and Industrial Installations issues. Six delivery centres mastery Altran's approach. They are focused on Quality Management Systems, Process and Product Quality Assurance on one hand, and Industrialisation, Costing and Asset Management on the other hand. Industrial installations, buildings and infrastructures are the best playground for these skills and knowhow. The team is managing industrial projects focused on equipment and processes (full scope of design, engineering, project, commissioning, and start up phases). The team is also making production meaning more efficient reliability studies, FMEA, mapping of maintenance activities, process optimisation, energy, mass and power balances, Business Process Reengineering, Value Stream Mapping, organisation efficiency & effectiveness assessment, management system set-up...). Finally, the consultants help industrials to assess and to manage EHS Risks Volatile Organic Compounds balance, ATEX, Safety Integrity Level, Safety Concept, Regulation and Standards studies, Hazard Studies, Risk Assessment, Permitting.</p>	
Role in the project	
<p>The main objectives of this work package 1 are to: assess the environmental footprint of the ports (carbon, waste, air, water...); identify key levers to improve the environmental footprint thanks to systemic port</p>	

modelling; build the vision and the roadmap for the lighthouse and fellow ports to 2030, 2040 and 2050 ; define the target governance to animate the ecosystem around the Green Port.

Activities will be based on inputs from Task 1.1, systemic modelling, benchmark and ideation workshops with the different partners. Details are as following: Identify structuring market & regulatory trends, technology levers and proven Green and Smart best practices in Europe / around the world; identification of Green / Smart use cases that have proved their worth beyond communication; definition of the limit of the port systems and data collection on raw material, energy, mobility, logistics, industry, waste, end of life management, etc.; development of a generic port modelling system adaptive depending on the port use case; build and detail the Green Port strategy: ambition and vision; decarbonisation strategy; main use cases according to different "Green" axes (data, energy, mobility, logistics, industry, waste, management ...) ; Prioritize higher-value Green use cases for the activities of the port area according to the different axes (data, energy, mobility, waste, logistics, industry, management, etc.)

The main objectives of this **work package 2 - task 2.1 - Low Carbon Energy Supply and Demand** . The purpose of this task is to propose a panel of technological solutions to mitigate carbon emission in ports. Sources of CO2 emission in ports are various: traffic, port shuttles, towing, cold ironing, industry, heating and powering of buildings, and will all be addressed. The object is also to assess the actual situation of the different port energy conditions (energy audit) and assess the potential of the new technologies. All these technologies will be implemented in a simulation software that will help to decide which solution should be deployed in each port. The **task 2.1.4 Low carbon energy production and storage**; all these solutions will need to be powered by low carbon energy using a multi-energy hub approach. The following sources and technologies will be studied and evaluated. First, green electricity will be produced by using renewable energies available in ports: solar, wind, and marine (wave, current, thermal and osmotic) power. A solar HUB will be deployed by SIARQ. Solar HUB is capable of generating enough solar energy to make work the Solar Hub system itself including lighting, sensors and other electronic devices. Lighting can be customized and controlled remotely depending on the port's needs, increasing the efficiency of the lighting system. The energy produced by this hub can be stored with batteries and be used to charge electric vehicles like scooters, bikes, light weight vehicles, drones and other devices and meet the electrical demand of mobility in Ports.

If electricity is not enough or not possible, low carbon fuels will be used. This includes hydrogen, ammonia, biofuels and LNG. The last one, even if not totally decarbonized, can be a good intermediate solution in a process of transition from carbon to renewable energy. The feasibility of on-site production will be examined. If not, attention should be focused on the choice of low carbon and responsible supply chain. Hydrogen can be produced from the green electricity mentioned above or imported. Several methods to produce hydrogen have already been validated and are industrially used: hydrolysis, thermal decomposition, use of ammonia or bacteria. Classic storage solutions with cryogenics, compression, ammonia, solid components etc. will be deliberated on. Innovative storage methods like the use of organic liquids will also be evaluated. Hydrogen is then used for power generation with internal combustion or fuel cells. Finally, the use of biotechnologies will be studied: the possibility to use algae tanks to both capture CO2 emissions (from traffic, ships, industry...) and produce biofuel will be analyzed.

All these technologies will be considered and evaluated above the following criteria: maturity, cost, range of power available, time of building, impact on biodiversity, safety, acceptance by population. They will then be implemented in a software for help to the decision and conception of a low carbon energy grid (multi-energy hub). A similar software has already been developed in Altran for the production, storage and use of hydrogen. It will be extended to the other technologies considered. The user chooses technological solutions for the production, storage and transportation of energy and the tool will provide an analysis of cost, performance, safety and environmental risks.

The main objectives of this **work package 3** - task 3.1 – Port services adaptation. GREENING PORTS will test the overall system developed in WP2 according its 3 layers :

ICT Architecture: we will carry out project studies and coordination to get ICT infrastructure connected with satellite imaging WEkEO cloud platform and its Application Programming Interface and local Solar Hub network equipped with environmental, noise and traffic sensors, whose interfaces are managed by Urban Brain.

We will develop data cubes connected with the ICT system (see Task 3.2).

Energy simulator: we will tune model settings for SmartNautilus with specific data from the ports (CO2 emissions and energy consumers). We will study, purchase and manage the implementation of connectors. Consequently, we will fine-tune the DSS and will produce a mapping of energy sources and sinks within the port environment.

Services & applications: in the continuation of WP2, we will adapt and test services and applications dedicated to Logistics, Mobility, Environment and Energy.

LOGISTICS - We will assess and set up Green Smart Logistics processes and Seamless Logistic Operations models for real world port activities. We will operate their tests and functional validations bound to TRL7 step and send them to WP4 monitoring and exploitation phase.

MOBILITY - We will apply the same adaptation and TRL7 demonstration process to Multimodal Access (On-Demand Transport & Smart Park Zones).

ENVIRONMENT - Solar Hubs will allow deploying Environmental Services, as they will be equipped with GHG and PM10 sensors.

ENERGY - We will set up Low Carbon Energy solutions previously developed or selected in WP2: adapting Energy Smart Grid solutions to their future environment. We will provide Engineering studies concerning tie-ins and interfaces with Port infrastructures. Afterwards, we will deliver project management for purchasing, follow-up for procurement, works, and commissioning of the solutions. We also will run Energy Simulations on every port case as described into tasks 3.3 to 3.6.

GREENING PORTS will gather lessons learnt during studies and project phases on issues and standards applied on port environment and will create guidelines, rules and standards for port solutions adaptations.

The main objectives of this **work package 4** - Objective: Assess and enhance environmental port impacts.

Key personnel

Arnold COPPIETERS (M) - Engineer:








Arnold holds a mining and ore dressing engineering diploma from Brussels (ULB 1991) and MBA from Solvay Brussels School (SBS 1995). After his military service as Officer, he began his carrier at ULB at the Dpt of Research & Development of processes with positive impact on Energy and Environment, working on European projects for aluminium process, and for quartz grinding optimisation. Three years later, he stepped into telco, broadcast, databases, and Internet convergence as project manager and he carried out for BELGACOM new solutions as Extranets, EDI, e-commerce, and virtual market places for Belgian accounts. In 1999, he entered as Business manager within ALTRAN where he still develops consulting and project activities through various functions as Business Unit Management, Business Development, and currently Solutions Architecture.

Gaëlle MOURET (F) - Engineer/Project Manager:

Gaëlle has an engineering degree in Aeronautics and a master degree in Fluid Dynamics and Thermal. During her PhD at CERFACS, funded by Safran Aircraft Engines, she studied the numerical modeling of internal flows in turbomachinery. After her thesis defense in 2016, she did a postdoctoral fellowship at ISAE – Supaero. Since 2019 Gaëlle is being working for Altran where she still studies internal flow and thermal of turbomachinery. She is also working on the mathematical modeling of a pulsating heat pipe within the European project PHP2.

<p>Mikel GARAY (M) - System Architect:</p> <p>Mikel has participated, over the past 20 years, in various projects in aeronautics, space and railways sectors, related to the development of complex system and equipment integration. His tasks included the full product development life-cycle from de requirements, conception, manufacturing, test to validation. Mikel is an expert in thermal simulation analysis of the electric /electronic equipment and qualification tests of power distribution box in accordance with DO160 research projects in multi-physics co-simulation (electrical/thermal) and energy harvesting.</p>
<p>Rémi JULIO (M) - Chemical engineer, PhD:</p> <p>Rémi is working as a project leader on Life Cycle Assessment (LCA) and eco-design activities at Altran Toulouse, Rémi has always been passionate about the nature and complexity of our environment. Sensitized during his youth to the impact of human activities on the environment, he chose to focus on the chemistry and HSQE sector during his engineering training in order to work on this problem. He completed his initial training with a doctoral thesis on LCA. Wishing to work on concrete themes, he joined the industrial sector via Altran to have the opportunity to help a large amount of industrial actors coming from different sectors to optimize their environmental performance.</p>
<p>Relevant Projects</p>
<p>CityFlows : Decision-support system for pro-active crowd management of crowded urban spaces, EIT – Urban Mobility https://www.eiturbanmobility.eu/projects/cityflows/</p>
<p>PRO-MaaS : Policies and Regulations required fOr enabling the MaaS concept, EIT – Urban Mobility https://promaas-eitum.eu/</p>
<p>Urban Mobility Operating System – UMOS, EIT – Urban Mobility https://umos-alliance.eu/</p>
<p>PHP2 : Pulsating heat pipes for hybrid propulsion systems, H2020 CleanSky2 Joint Undertaking http://php2-project.eu/</p>
<p>COMP4DRONES : Holistic ecosystem providing a framework of key enabling technologies for safe and autonomous drones, H2020 ECSEL Joint Undertaking https://www.comp4drones.eu/</p>
<p>Relevant publications and products</p>
<p>Internal R&I project “SISTER” on H₂ storage and the Tool for Hydrogen Storage Optimization “ThySO”.</p>
<p>Internal R&I project “VIABLE” on development of e-VTOL with hybrid energy source (Battery and Hydrogen Fuel Cell)</p>
<p>Internal R&I project “EEE (Energy and Environmental Efficiency)” on sustainable assessment of innovative technologies dedicated to aeronautics, including the assessment of additive manufacturing technologies, of hydrogen based propulsion technologies (by combustion or fuel cells uses) as well as methodological developments of LCA method (coupled to digital twins).</p>
<p>Internal study on standard injection stations, defining design standards of the parts of equipment, piping, electricity/automatism/instrumentation and of gas injection stations.</p>
<p>Research projects in multi-physics co-simulation (electrical/Thermal) and energy harvesting with publication of article for NAFEMS conference 2014.</p>

Coupling process simulation and environmental LCA: Eco-design of a microalgae fractionation process. <i>R. Julio, J. Albet, P.Y. Pontalier, C. Vialle, C. Sablayrolles. SETAC Europe 22nd LCA Case Study Symposium, September 20-22, 2016 – Montpellier, France.</i>
Using Experimental design for Life cycle inventory – Application to the case study of a wheat bran and straw extrusion process. <i>R. Julio, C. Sablayrolles, C. Vialle, L. Jacquemin, P.Y. Pontalier, J. Albet. LCA Food, October 16-19, 2018- Bangkok, Thaïlande.</i>
Sustainable design of biorefinery processes: existing practices and new methodology. <i>R. Julio, J. Albet, C. Vialle, C. Vaca-Garcia, C. Sablayrolles. Biofuels Bioprod Biorefining. 2017 Mar 1;11(2):373–95.</i>
Using Experimental design for Life cycle inventory – Application to the case study of a wheat bran and straw extrusion process. <i>R. Julio, C. Sablayrolles, C. Vialle, L. Jacquemin, P.Y. Pontalier, J. Albet. 11th International Conference on Life Cycle Assessment of Food 2018 (LCA Food) in conjunction with the 6th LCA AgriFood Asia and 7th International Conference on Green and Sustainable Innovation (ICGSI). [Proceedings].</i>
Sustainable assessment of additive manufacturing processes through process simulation and LCA. <i>R. Julio, S. Dos Santos, B. Doualle. AvniR Conference, 2019, Lille, France. [Proceedings].</i>
Infrastructures
CFD commercial and open source software (ANSYS Fluent, Code_Saturne, Cantera)
CAD and System Engineering software (CATIA, Siemens Amesim)
Post-processing software (Paraview, Ensignt, Python)
HPC Cluster (880+ cores) and numerous high-end workstations
To perform sustainability assessments, we essentially use LCA tools. Altran owns one license of Simapro software, 2 licenses of Gabi software, 2 licenses of Ecoinvent database coupled to OpenLCA softwares. Moreover, we also developed our internal software for regulatory GHG balances.

Factual	FACTUAL
Description of the organisation	
<p>Factual is an innovation and strategy consultancy firm focused on mobility. Based in Barcelona but with a genuine global mindset, Factual liaises with a wide range of stakeholders, public and private, and support them in understanding and effectively adapting to a complex, interconnected, dynamic mobility ecosystem, providing strategic advice, highly specialised training, innovation methodologies and tools, and outreach support. Factual believes in high performance individuals delivering passion, expertise, vision and commitment to fulfilling customers' goals, and always steer towards exceeding them: meeting a customer's goal is not a finish line for Factual; our mindset is already planning for the next frontier, identifying a new revenue stream, working to leverage an unmet opportunity.</p> <p>We keep a keen eye into the big picture and so we follow global trends (re)shaping future mobility from the smart combination of autonomous, electric and shared features transforming the automotive industry for the better, to disruptive, new mobility paradigms, such as Mobility as a Service (MaaS), redefining how mobility is consumed from a brave new customer-centric perspective, setting a playing board where cities, public transit operators, automotive companies, big tech firms and burgeoning start-ups interact.</p>	
Relevant skills/experience/technologies	
<p>Factual staff members are mobility specialists accumulating an outstanding track record of participating in mobility related and EC-funded projects. Factual brings in their background and knowledge, adapting to our customers' requirements with a more flexible, sharp, and focused approach than more traditional consultancies. Following are the key skills offered by Factual:</p> <div> <div>  <p>Foresight</p> <p>We delve into trends shaping future mobility and provide market insight, impact analysis and strategic advice</p> </div> <div>  <p>Research</p> <p>We deliver impact through collaborative innovation in EC-funded projects</p> </div> <div>  <p>Factory</p> <p>We conceptualise and develop disruptive mobility products & services on our mission to change the future of mobility</p> </div> <div>  <p>Venturing</p> <p>We scout, coach and accelerate mobility startups, provide investment advice, and develop go to market strategies</p> </div> <div>  <p>Training</p> <p>We bring in industry leaders into tailor-made courses to give you timely updates to remain competitive</p> </div> <div>  <p>Hack!</p> <p>We ideate & produce hackathons & ideathons; we make public & private stakeholders come together in innovation workshops & sectorial clusters</p> </div> <div>  <p>Outreach</p> <p>We design communication strategies, generate expert content and organize events</p> </div> </div>	
<p>Factual keeps a keen eye into disruptive, new mobility paradigms, such as Mobility as a Service (MaaS), redefining how mobility is consumed from a brave new customer-centric perspective, setting a playing board where cities, public transit operators, automotive companies, big tech firms and burgeoning start-ups interact.</p>	
Role in the project	

In the Greening Ports project, Factual **will lead the WP2.4 Tools for multimodal access** and it will participate in all the work packages to develop the mobility services for ensuring a seamless mobility and multimodal passenger transport between the city and the port premises: the innovation chain will start with the evolution and adaptation of the mobility services for facilitating port access and traffic reduction to meet Green Deal goals.

FACTUAL will coordinate the activities related to ensuring first and last mile mobility to passengers and workers of Green Ports, ensuring that different sustainable mobility options are integrated into an integrated Mobility as a Service platform tailored to the port specific needs.

Three main services will be explored:

"Smart Park Zone": European Ports suffer an intense traffic of international heavy trucks within a very large parking facility with several port terminals and dock gates. Many ports already have IT systems to manage & schedule reservation to perform Loading and Unloading Operations in Docking Gates. However, ports do not have digital systems to properly manage truck drivers within its parking and dock areas and they lack digital messaging system between the Port's Operation Managers and Truck drivers. We propose to create Smart Parking Zones in several locations of the port, where truck drivers will have an app to communicate with the parking manager, and lightweight, cheap and patented technology from "Smart Park Zone" (a Catalan SME) will be used based on Bluetooth technology and customized hardware. Factual to coordinate pilot design adapted to the requirements and specific characteristics of ports on-board the project willing to trial a more efficient, environmental friendly parking management solution. Factual to coordinate and define pilots with engaged ports, identify specific requirements, characteristics of each port (such as available parking spots, available IT systems and how to upgrade them, existing infrastructure and how to install Bluetooth detectors, etc.).

"Sustainable Mobility as a Service for ports": app + MaaS engine customized for ports, connecting cruise travellers to the city centre for touristic visits and port workforce to main transport hubs, where electric shared vehicles will be preferentially offered, as well as electric shuttles, or bus on demand (thus increasing occupancy rate and so overall emissions, etc.). Factual to design pilots leveraging technology from existing MaaS providers. Factual to define use cases, identify available mobility service providers eligible in each pilot city/port to provide sustainable transportation for cruise travellers, and develop the customer journey, as well as define, measure, monitor and report on KPIs aligned with GD.

"Micro subsidies for sustainable mobility services" that connect the city centre to the Port and to transport hubs for an intermodal connection city centre – Port. This is a concept that FACTUAL is currently developing in its FACTUAL Factory as an MVP, in order to extent the subsidies from public transport to micro mobility services to promote multimodal transport while reducing private vehicle trips.

The Task 2.4 - Tools for multimodal and efficient access – Period: M3-M54. On-demand sustainable transport service from/to the city. An on-demand transport tool for the connection between port premises and city centre will be developed using NE-MI mobility application (FACTUAL's linked third party) aiming to increase the efficiency of the public transport by optimizing kilometres travelled, avoiding journeys without passengers, minimizing CO2 and pollutant emissions, while providing a user-centric approach. The design of the service will be adapted to the ports' framework: a previous assessment report will be developed to select flexible itineraries, potential virtual pick-up points and expected timings (by FACTUAL) and to meet local regulations (by UNIGE). The service will provide information in real-time to the users and also includes a driver mode application which will also be tailored to inform about flexible routes and pick-up points in order to maximize the efficiency of the transport. The dashboard will allow project partners to collect KPIs in different aspects such as usage, CO2 savings and user acceptance. In addition, an innovative evolution will be developed by plugging a micro-subsidy calculation engine for promoting sustainable trips. The NE-MI application will be evolved for adding a payment channel and to include the micro-

subsidies (discounts) for specific sustainable trips (e.g. workers receive discounts for commuting by public transport) in order to boost multimodal passenger transport and improving port accessibility.

Development of smart park zones for trucks: A group of parking spaces delimited by signs with a Bluetooth device and controlled with a mobile app for a specific target of vehicle or driver profiles will be developed for a real-world test in the lighthouse port and one of the fellow ports. It provides parking and additional digital services for a sustainable and smart mobility while improving user experience as a mobile app or connected truck can automatically detect the type and code of the closest smart zones to display clear parking conditions and initiate digital procedures such as “get a proof-of-parking”, “wait at parking to receive your click & car order” or “receive assistance on arrival”. Each Smart Park Zone code is linked to a SaaS platform that manages its parking conditions (permit, time, fee) and default instructions, according to vehicle’s and driver’s profile at that precise location and time of the day. Smart Park Zone enables an accurate micro-regulation and dynamic management in on/off street parking, which allows sustainable and Smart Urban Mobility policies based on vehicle emissions (LEZ), carbon taxation and autonomous vehicles parking infrastructure.

Key personnel

Marc FIGULS (M) - Strategy Consultant at Factual. M.Sc.:

Marc is graduated in a degree in Civil Engineering by the Polytechnic University of Catalonia (UPC) with experience in mobility and road safety projects since 2009. From 2014 to 2020, he was project manager and technical director at RACC Foundation leading a 5-people staff team, involved in national projects and 14 EU funded projects about automation, Mobility as a Service, ITS and road safety. Former member of ERTICO ITS Strategy Committee, member of FIA Transport & Mobility Working Group and current Accredited Member of International Road Assessment Programme (IRAP).

Martí JOFRE (M) - Cofounder and Managing partner of Factual:

Martí is graduated in a double degree as a Telecommunications Engineer from the Polytechnic University of Catalonia (UPC) and Telecom Paris, and a master’s in marketing management from EADA Business School. He has extensive experience in the management of R&D projects focused on the mobility and technology sector, obtained through collaborations with the Creafutur Foundation and the Pildo Labs company, as well as previous work in the European Space Agency (ESA), the Aerospace Technology Centre (CTAE) and the European GNSS Agency (GSA). He has been involved in close to 20 European projects (2 as a coordinator) and many other proposals. He has been selected by the European Commission as expert reviewer of several GSA, H2020, Shift2Rail, and CEF projects.

Alexandra HOSLI (F) - Senior Consultant in Mobility Innovation & Strategy at FACTUAL:

Alexandra is graduated in a M.A. degree in Marketing, Service and Communication Management at University of St. Gallen (HSG) in Switzerland and CAS in Applied Information Technology from the Swiss Federal Institute of Technology in Zurich (ETHZ). Broad experience in the automotive and future of mobility industry. Lead various mobility innovation projects in Switzerland. Specialized in mobility concepts for corporates, e-mobility, parking, strategy development and trend monitoring with a passion for customer-centric solutions.

Josep LABORDA (M) - Factual cofounder and CEO:

Josep holds a M.Sc. degree in Telecommunication Engineering by the Polytechnic University of Catalonia (UPC). Between 2008 and 2019 he was Project Manager of Intelligent Transportation Systems at RACC Automobile Club. Before (2004-2008), he was business analyst at Deloitte. In recent years he has been responsible for RACC’s MaaS strategy by coordinating the “CityTrips” app and contributing to the MaaS Alliance, as well as member of the Strategy Committee at ERTICO. He has been involved in more than 10 European projects, and has coordinated several other proposals. He contributes as expert reviewer to


European Commission projects, and currently coordinates the ARIADNA Project (Awareness Raising and capacity building Increasing ADOption of EGNSS in urbaN mobility Applications and services).
Relevant Projects
The opportunity of MaaS in Catalonia (2019 - 2020) – multi-stakeholder funded project identifying the opportunities and challenges that Mobility as a Service (MaaS) and new shared mobility services can bring to urban mobility market players in Catalonia, including both public and private transport operators and other agents with interest on the sector such as automotive OEMs, road operators or public authorities http://www.maascatalonia.com
ARIADNA (Awareness Raising & capacity building increasing adoption of EGNSS in urban mobility Applications and services, 2019 - 2021) – Coordination and Support Action (CSA) coordinated by Mr LABORDA, from Factual, with the main goal to educate stakeholders in the public transport and wider ITS sector domains worldwide in the benefits of European GNSS (Galileo) to improve their operations, achieve better performance, and stimulate the adoption of this technology. http://ariadna-project.eu
DIGNITY (Digital transport in and for society, 2020 – 2023) – the project delves into the digital transport eco-system to grasp the full range of factors that might lead to disparities in the uptake of digitalised mobility solutions by different user groups in Europe. Analysing the digital transition from both a user and provider’s perspective, DIGNITY will present the challenges brought about by digitalisation, and design, test and validate the DIGNITY approach, a novel concept that seeks to become the ‘ABC for a digital inclusive travel system’. https://www.dignity-project.eu
E-CORRIDOR (2020 - 2023) – Innovation Action (IA) aimed at defining a framework for multi-modal transport systems to provide secure advanced services for passengers and transport operators. The framework will include collaborative privacy-aware edge-enabled information sharing, analysis and protection as a service. https://e-corridor.eu/
Relevant publications and products
RIDEAL is a micro-subsidy calculation engine which can be plugged on to any MaaS and Transport Service Provider platform. The engine comprises a database with geographic information on eligible areas and a set of rules to ensure that micro-subsidies fill gaps in public transport. With RIDEAL, subsidizers can target any person and any circumstance by applying specific subsidies to selected transport options to maximize societal and environmental goals.

OnAir	
Description of the organisation	
<p>Established in 1995, OnAIR is an innovative SME with a wide experience in the development of Optimization, Data Analysis, Computer Vision and Machine/Deep Learning applications. Current OnAIR activities mainly focus on system optimization (railway and marine traffic control and optimal planning), autonomous video surveillance (outdoor and underwater systems), advanced optical recognition devices (pattern recognition and deep learning), environmental monitoring (statistical modelling and forecasting) and predictive analytics software modules (automated diagnostics and prognostics based on machine learning methods). The development of computer-based algorithms for intensive data processing has been specifically targeted to low-cost devices (embedded CPUs), and to massively parallel units (GPUs), leading to highly optimized implementations. This interdisciplinary know-how allowed participation in many R&I projects, in close collaboration with Universities and public research institutes, both in Italy and abroad. To increase the network of partnerships and collaborations, OnAIR is an active member of the Technology District of Integrated Intelligent Systems in Genova (SIIT) and of the Cluster of Marine Technologies in La Spezia (DLTM). The current staff is composed of 8 experienced industrial researchers</p>	
Relevant skills/experience/technologies	
<p>The most relevant skill of OnAIR is the capability to conceive and realize intelligent software modules for automation systems. They are based on state-of-the-art methods of Applied Mathematics, Statistics and Artificial Intelligence, used for many different applications in industry and services. The company has a wide experience in the transport field, using Operative Research tools (Dynamic Programming and Graph Search algorithms) for real-time optimization of traffic flow in railway networks (aiming to reduce delays and save energy at the same time) and for choosing the best (and greenest) route/speed profile for ships with respect to sea conditions and specific hull/propulsion characteristics. Statistical modelling and learning-based methods (data analytics) are widely used to analyze and forecast data coming from many kind of sensors in order to identify possible anomalies and realize diagnostic and prognostic decision support systems. Moreover, modern computer vision algorithms (based on deep learning) are used to analyze images and video in order to detect patterns and objects of interest for advanced video surveillance, remote monitoring and underwater video systems.</p>	
Role in the project	
<p>OnAIR's contribution to the project will be the application of its optimization and data analysis experience to the development of services portfolio. A significant part of the proposed services relies on the development of advanced optimization and data analytics software modules, and so OnAIR will cooperate to the design, implementation and integration of some of these modules. Most of them are included into the optimized logistic services section (optimization of port traffic and terminal operations) and into the efficient energy services section (for ship and port operations). The strong existing connection with Genova University (leader of many activities) ensures an effective collaboration.</p> <p>In addition, OnAIR, thanks to its cross-sectional competences about Artificial Intelligence, Data Analytics and Computer Vision algorithms and tools, may provide a technical contribution, if needed, even in other part of the services portfolio, covering for instance some data processing aspects in environmental and mobility services, in close cooperation with all involved partners.</p>	

Key personnel
<p>Ennio OTTAVIANI (M) - CTO :</p> <p>Ennio received his Theoretical Physics degree from University of Genova in 1982. In 1984 he joined Elsas SpA (now Leonardo SpA), R&D Department, where he became Project Leader in several research programmes for Computer Vision and Pattern Recognition. Since 1999 until today, he has been Chief Technology Officer and responsible for all the research projects at OnAIR, focusing on the application of Operational Research, Computer Vision and Machine Learning methods in industry automation, traffic control, surveillance, life and marine sciences. During all his professional career, lasting about 35 years, he has been often involved in European and National Research Projects in a technical leading role. Since 20 years now, he is Contract Professor at Genova University (Department of Mathematics) for Applied Statistics, Computer Vision and Machine Learning courses teaching and for the tutorship of student stages in OnAIR. He is the author of over 50 publications about Artificial Intelligence applications.</p>
<p>Nikolla GJECI (M) - Programmer:</p> <p>Nikolla received his master's degree in Applied Mathematics in 2015. He developed a degree thesis focused on the automatic segmentation of computed tomography images, with presentation of original results. He joined OnAIR immediately at the end of his studies and participated in several EU research projects about AI applications in marine sciences and industry. He is actually involved as PM in a research projects about the development of a long-endurance sea surveying autonomous unmanned vehicle (ENDURUNS), and in the development of the SmartNautilus product for real-time optimization of the ship voyage with respect to the forecasted weather conditions. He acquired a wide experience in the management of complex software projects, in heterogeneous sensor and data integration and in the speed-up of computationally intensive tasks, both on highly parallel machines (GPU) and on embedded platforms.</p>
<p>Matteo FERRANDO (M) - Programmer:</p> <p>Matteo received his master's degree in Informatics Engineering in 2000. In OnAIR, he matured 20 years of experience in the development of software applications both in research projects and in specific customizations. He actively participated in the TMS (Train Management System) project for the Dutch Railways, where he played an important role in the definition, development and testing of the conflict detection and resolution module. He has good general knowledge of mathematical and statistical methodologies of data and image processing, and a specific knowledge of operations research and graph-based algorithms. He gained also extensive experience in the development of software applications for the management of complex systems, extended to all functional levels (specification definition, design, coding, testing, documentation).</p>
Relevant Projects
<p>Project “ENDURUNS” (European, H2020-MG-2018-2019-2020, ongoing): Development and demonstration of a long-endurance sea surveying autonomous unmanned vehicle with gliding capability powered by hydrogen fuel cell. The project will deliver a step-change in AUV technology by implementing a novel hybrid design power by hydrogen fuel cell. OnAIR software controls all sensors onboard the AUV (echosounder, underwater camera and others) and manages bathymetric and seabed data collection, storage and automatic processing (https://enduruns.eu). The project involves also Klaipeda Port.</p>
<p>Project “FairStations” (European, H2020-S2RJU-2017, completed in 2019): Future Secure and Accessible Rail Stations. The FAIR Stations project aims to develop solutions for improved users flow within the station, and at the platform train interface (PTI), paying special attention to the needs of PRMs. The project will conduct a study about station designs, as a benchmark. OnAIR responsibility was the automatic sensing of crowd levels by Deep Learning methods (http://www.fairstations.eu).</p>

<p>Project “SINDBAD” (Regional, POR/FESR, completed in 2020). The project foresees the realization of a data analytics web-based automatic service to support leisure navigation in the Ligurian Sea, able to integrate marine weather forecast data with structural characteristics of each boat or ship, and then to produce personalized alerts related to health (e.g. Motion Sickness Incidence maps). OnAIR led the project and realized automatic alerts and maps for several user types (https://www.sindbad-liguria.it). The project involved also Genova University.</p>
<p>Project “M3-HABs” (European, ENPI-CBC MED, completed in 2017): A pan-Mediterranean project regarding monitoring of harmful algal blooms, with particular reference to the <i>Ostreopsis</i>. The specific objective was to provide a common strategy for monitoring toxic microalgae, through the development of new, more efficient and common procedures and protocols, making the process mostly cost and time effective. OnAIR was responsible for the design of an automatic cell counter (with performance certified by an Italian Authority) and for the definition of a forecasting tool for harmful algal bloom based of meteo-marine data (https://m3-habs.net). The project involved also Genova University.</p>
<p>Project "PLUG-IN" (National, MIUR L.297/13, completed in 2016): Urban Mobility Platform with Information Management from Heterogeneous Sources. The PLUG-IN platform estimates the current state of the traffic, forecasts the evolution, defines possible strategies to manage congestions and provides in real-time information, both for the community or personalized, to all the users. On AIR was involved in railway network state estimation and delay forecasting at the stations, train speed optimization in order to save energy and avoid power faults and train speed adaptation in order to maintain connections with the local public transports. The project involved also Genova University.</p>
<p>Relevant publications and products</p>
<p>Product “SmartNautilus” is a voyage optimization solution that significantly reduces ship fuel consumption and increases navigation comfort and safety. It is based on both advanced mathematical simulation of ship hydrodynamics and fuel consumption and/or ML models that, once calibrated to the specific vessels, are able to accurately estimate fuel consumption and the effects of the sea conditions on the propulsive performance, safety and navigation comfort. Using this model, SmartNautilus computes the minimum-cost route and speed profile for a ship on a given trip (https://www.smartnautilus.com).</p>
<p>Product "TMS" is an autonomous system for real-time management of rail traffic on a specific network. The objective of the TMS is to execute a predefined plan in the best possible way, given a certain optimization criterion. In the presence of perturbations due to delays, traffic limitations or other disturbances, the TMS foresees and solves future conflicts, generating in real time a new plan without conflicts, modifying the travel times of some sections, changing the train ordering and taking advantage of alternative routes. The TMS also supports the realization of this plan by indicating changes in speed, routes to be followed and booking times for all involved railway sections (http://www.onairweb.com/project.php?i=14&l=en).</p>
<p>Patent EP2863257 "GUARD-1" is a new stand-alone low-cost device for underwater imaging and recognition of marine organisms. GUARD-1 was aimed at studying and developing an autonomous underwater system for image acquisition and recognition in long duration missions. Images of underwater organisms from the water column or from the seabed are captured from the Image Acquisition Component, stored into the Storage Component and elaborated onboard by a Processing Component capable to run algorithms for image processing and pattern recognition. To deal with the lack of natural light, it includes also a controllable low-consumption lighting system and a programmable logic for its activation.</p>
<p>Zaccone R. & Ottaviani E. & Figari M. & Altosole M. (2018) Ship voyage optimization for safe and energy-efficient navigation: A dynamic programming approach, <i>Ocean Engineering</i> Vol.153 Pages 215-224</p>

Marini S. & Gjeci N. & Govindaraj S. & But A. & Sportich B. & Ottaviani E. & Marquez F.P.G. (2020) ENDURUNS: An Integrated and Flexible Approach for Seabed Survey Through Autonomous Mobile Vehicles, *Journal Marine Science Engineering* Vol. 8, 633

Creotech Instruments S.A.	
Description of the organisation	
<p>Creotech Instruments S.A. (CTI) was established in 2008, headquarters and manufacturing facilities are located in Piaseczno, Poland. In 2013 Creotech began to develop products and services for the space sector, entering a path of dynamic development. Within two years the company invested in an ESA-certified clean room and laboratory, trained expert engineers, signed first contracts with ESA and European space industry ‘primes’ and acquired a strategic investor – Polish State Industrial Development Agency (IDA). Presently IDA has 19% of the shares, whereas other private investors have 81% of the capital. From September 2015 Creotech is ISO 9001 certified, extended in 2018 by ISO 9001 Earth Observation Services. The company employs about 90 people, mostly engineers and scientists. Its dedicated R&D and production teams specialize in design and manufacturing of electronics for space and scientific instrumentation as well as scientific cameras for astronomical purposes.</p>	
<p>In the area of Scientific Instrumentation, CTI is a manufacturer and supplier of precise measuring instruments for research institutes around the world. Components manufactured by Creotech in the MTCA technology and company’s time synchronization equipment compliant with the White Rabbit standard are used, among others, by the European Agency for Nuclear Research, CERN, the Institute for Heavy Ion Research GSI and the German Electron Synchrotron DESY in Hamburg.</p>	
<p>Creotech Instruments S.A. is currently the fastest growing Polish company operating in the space sector. The company participated in a number of space projects carried out for the European Space Agency (ESA), joined by Poland in 2012. Creotech has built and equipped a spacecraft assembly clean room, meeting the rigorous ESA standards for spacecraft components assembly – elements and modules of satellites and space stations. Activities conducted within the framework of European Space Agency contracts include, among others, development of own modular Hypersat satellite platform.</p>	
<p>In the last years company has focused also on satellite data acquisition, mass storage and processing, being the leader of EO IPT and CREODIAS projects for ESA (Copernicus DIAS platform proof of concept and then commercial implementation). The CREODIAS platform is now in full operation, currently storing appr. 17 PB of continuously updated Copernicus program data and allowing for local data processing in the high-performance IT cloud. Being the consortium leader and Copernicus Relays representative and Copernicus ambassador in Poland, CTI has been very active in CREODIAS promotion and marketing, extended in many practical cases to the general promotion of EO data use, with particular focus on the benefits coming from the Copernicus program. CREODIAS platform has proven to be a key element of many ongoing initiatives, providing not only Copernicus data and processing capabilities, but also linking potential users with experts and solution providers.</p>	
Relevant skills/experience/technologies	
<p>In 2018, CTI participated to ESA feasibility study followed by the ongoing service demonstrator project on UAV (Unmanned Aerial Vehicles) BVLOS (Beyond Visual Line of Sight) flights planning with special focus of terrain profiling based on Copernicus (Sentinel 1), SRTM and Lidar data use. This activity opened the new expertise area and resulted in CTI’s active participation to multiple automated BVLOS drone use related initiatives. This includes involvement in EU U-Space program activities and various UAV related research and commercial projects. One of the latest outcomes is the growing CreoScan commercial products</p>	

family (www.creoscan.com). In 2019 CTI delivered a set of ADS-B ground stations for UAV traffic monitoring integrated with Polish Air Navigation Services Agency systems (PANSA-UTM, the first certified UAV traffic monitoring system worldwide).

CreoScan elements (HW and SW) are intended to support different aspects of UAV operations, from data processing in the field, through flight planning and execution, to real-time operations monitoring and dynamic parameters analysis in 3D environment

Role in the project

In line with CTI expertise and current focus in EO data and UAV use and widely understood operations support the following related elements can be listed:

Delivery of the required UAV management infrastructure elements: IT resources, data connections, ADS-B/GSM/LTE based UAV operations monitoring system (lightweight drone transmitters & portable ground stations) and UAV dedicated portable processing and communication environments for field use.

Delivery of required geospatial & aeronautic data (including aerial & satellite imagery).

Development of the dedicated real-time data visualisation system for port operations support (with required analytics), data and analytical algorithms integration.

Support for the requirements definition and all field cases related to UAV use – required performance, data handling, presentation, drone operations monitoring and portable IT processing infrastructure.

Management of UAV activities in the field cases (operations monitoring in co-operation with certified local drone operators)

Analysis of current UAV law and definition of required developments in active participation to legal part of the project.

On this work package 3, task 3.2 – Digital activities : The task covers delivery and integration activities of the project outcomes in their digital dimension.

Develop GREENING PORTS Data Cubes: definition of the data sources and management scope (content, interfaces, standards, format conversion, Port Data Sharing) and deliver the architecture schema and Port Data Management Plan (PDMP). Prototype demonstrating data cubes structure, collection handling and functional organization of all data and data ingestion methods. Adaptation for final solution: implementation efficiency/optimization mechanisms for all participating ports.

GREENING PORTS Digital Platforms, integration of digital outcomes: port Digital Platforms design activities: activities will be run in parallel and in close co-operation with Data Cubes design. The prototype allowing to demonstrate and validate (in link to Data Cubes prototype delivery) the platforms structure, features and functionalities both in technical and user dimensions. Final solution of the platform: using full Data Cubes functionality and providing required digital outputs towards the identified stakeholders.

Key personnel


Pawel CZAPSKI (M) - PhD:

Pawel is graduated of Warsaw University of Technology (Faculty of Power and Aeronautical Engineering), Nanyang Technological University School of Computer Engineering in Singapore (Computer engineering). Started his career in the Industrial Research Institute for Automation and Measurements, Warszawa, Poland, then in the Institute of Aviation (Warszawa), gathered expertise in the fields of the radio-communication system development for UAV missions, development of a mission control centre for remote sensing missions, development of a closed-loop control system for aircraft operations, algorithms optimization for helicopter manoeuvre prediction (as a head of data processing and remote sensing divisions). Currently in Creotech Instruments as a lead engineer and expert analyst (analysis of remote sensing applications for a microsatellite platform, analysis of scientific payloads for remote sensing microsatellite missions).

<p>Grzegorz KASPROWICZ (M) - PhD, the head of R&D at Creotech Instruments S.A. and a researcher at the Warsaw University of Technology (WUT) and the co-founder of CTI:</p> <p>Grzegorz used to work as a researcher in hardware and systems development at the Center for Theoretical Physics, Polish Academy of Sciences and at CERN, where he designed measurement and control systems for high energy physics applications. He is a specialist in digital and analogical signal processing, FPGA and DSP systems and embedded systems. He has significant experience in leading R&D projects, both at CTI and at WUT and will be responsible for all HW development related issues.</p>
<p>Krzysztof MYŚLAKOWSKI (M) - MSc,:</p> <p>Krzysztof is graduated in a telecommunications technology engineer graduated from Warsaw University of Technology, with MBA from the Kozminski University (Poland). Currently he is working at Creotech Instruments as Business Development Director conducting various projects on a national and international level performing in areas such as Business Management, Sales Development, Leadership and Strategy, Marketing, Deep Telecommunication and IT business understanding, Sales process execution based on consultative selling and value based selling model, Launching new businesses and portfolio on the market. Recently he has taken the leading role in CREODIAS Platform implementation for European Space Agency and in all CTI's UAV related research and commercial projects.</p>
<p>Bernard STEPIEN (M) – MSc:</p> <p>Bernard is graduated in electronics and radiocommunication engineer with MSc degree, graduate of Merchant Marine Academy in Gdynia (Poland). His work experience includes positions such as a certified sea radio operator, responsible for ship radio and satellite communications, later Project Manager for various telecommunication projects (cellular networks implementation), Care Manager, Care Management Services Manager for West and South Europe region at Nokia. Service Maintenance Area Director at PGE Systemy S.A.(IT Shared Service Centre for Polish Energy Group – 40.000 users). Currently he works at Creotech Instruments as Business Development Manager conducting various projects on a national and international level, responsible for Business Management in widely understood EO data area (geoprocessing, satellite imagery, EO services creation and delivery, UAV).</p>
<p>Relevant Projects</p>
<p>EO-IPT/EO-CLOUD – ESA project serving as practical POC for DIAS idea, successfully executed in 2017 with Creotech Instruments as the consortium leader (more than 4 PB Copernicus Program local data storage co-located with cloud processing infrastructure followed by CREODIAS – Delivery (2018) and operations of one of the four ESA commercial DIAS platforms. www.creodias.eu</p>
<p>DRIVER+ - European project (led by JRC) on innovative solutions use in Crisis Response with DRM solution transferred onto mobile/portable environment (usable at crisis site without Internet connection) and utilised as one of the important elements supporting field modules and decision makers in simulated case of pan-European support for a country affected by large forest fires</p>
<p>BFPaaS – BVLOS (Beyond Visual Line of Sight) Flights Planning as a Service – ESA feasibility study followed by the service demonstrator project related to UAV (drone) operations planning and execution with special focus on the terrain profile pre-flight assessment (use of Copernicus Sentinel 1 radar imagery and other available geospatial data to derive the actual terrain profile along the planned flight route)</p>
<p>SAMPLE – air obstacles discovery and monitoring service for aviation. Electronic Terrain Obstacles Database generation (eTod) using high resolution satellite and UAV data (project sponsored by Polish National Research and Development Centre)</p>
<p>Relevant publications and products</p>


CREODIAS – www.creodias.eu, Copernicus DIAS (Data and Information Access Services) and high performance IT cloud computing environments with flexible use possibilities

CreoScan – UAV automated operations support products family (www.creoscan.com) including DRM (Drone Rapid Mapping), FMS (Flight Monitoring System), ADS-B groundstations, high performance industrial LTE modems.

SINAY	
Description of the organisation	
<p>Founded in 2008, Sinay is a tech start-up that helps maritime-based businesses around the world to manage data related to operations and environmental impacts. Sinay benefits from a more than 10 years of experience in collecting & analyzing maritime data to create relevant and actionable insights.</p> <p>Sinay's solution, the Sinay Hub is a single platform dedicated to maritime industries where data are gathered, analyzed, structured and transformed thanks to advanced AI technologies in order to create key indicators and metrics.</p> <p>The later are accessible through several modules that solve major pain points. Each module addresses a specific area such as air quality, underwater noise impact, water quality, ship route and voyage management, ETA or fleet management... - to create a real-time situational awareness and consequently help the maritime industries to make the right decisions at the right time in order to optimize their operations and to seamlessly comply with regulations.</p>	
Relevant skills/experience/technologies	
<p>The Sinay tech team is composed of more than 40 people including developers (with 4 Ph.D.), Ai experts and data-scientists, maritime biologists. The Sinay Hub is natively connected to EMODnet and Copernicus databases, and also aggregates more than 150 terabytes of data from various open-source providers –it also includes 3 years of AIS data and more than 10 years of historical meteocean data.</p> <p>Based on these data, the Sinay team has developed 60 proprietary AI algorithms running on a cloud-based infrastructure in order to create specific real-time key indicators as well predictions for the maritime industries. Additionally, the Sinay Hub simplifies daily tasks thanks to various features such as generation of reports – automatically or on-demand – in few clicks and sending of real-time alerts based on the parameters threshold that clients can configure by themselves. Sinay works currently with more than 10 Ports to optimize logistics, or to monitor environmental parameters to easily comply with regulations and prevent the impacts on sea life.</p>	
Role in the project	
<p>SINAY has developed data and IT technologies for maritime activities: expertise in vessel route optimization and voyage planning, ultimately we can better predict and optimize fuel consumption having positive impact on decarbonization; brings technical knowledge in environmental monitoring (air, water quality, aerial noise and underwater noise) including AI modules which provide prediction and monitoring of impact of human activities; brings expertise in maritime logistics (ETA, route optimization, port call planning, port congestion prediction ...) allow for optimization of port operations and collaboration between the various stakeholders of the port activities; realize these features, SINAY makes intensive use of a large variety of data (including satellite data) coupled with advanced AI.</p>	
Key personnel	
<p>David LELOUVIER (M) - Managing Director:</p> <p>David LELOUVIER is graduated in a master's Degree in Business Administration – Engineering Degree from Telecom Paritech. He has 20 years of experience in international management, operations management and he is specialist in the development of innovation strategies.</p>	

<p>Experiences : definition and development of the corporate strategy and product roadmap integrating Big Data and breakthrough AI technologies at Sinay; responsible for operations, business development and numerous projects as Operations Director at BlinkSight; acceleration of more than 30 companies and organization of more than 15M€ of financing as Managing Director of his company LeoDev; elaboration and implementation of business development and operational strategy as Operations Director at Moversa.</p>
<p>Ahcène SADI (M) - Cloud Architect:</p> <p>Ahcène SADI is graduated in a thesis in Computer Science and Applications and a master 2 in computer science and networks. He has 8 years' experience as a Full Stack Developer and he is expert in New Web technologies, distributed architectures oriented micro-services: RestFull architectures, Web sockets / SQL and NoSQL databases / Cloud Computing & Big Data / Advanced Algorithmics.</p> <p>Experiences: IT framing and participation in the design phases of projects; management of Sinay's software architecture and IS evolutions; design of a microservice-oriented framework with the Domain Driven Design (DDD) approach; Development of the core functionalities of this framework; Coordination of the customizations of the SINAY platform for various clients: PNA, RTE, Port of Saint-Malo, EDF, Trans Adriatic Pipeline, etc.</p>
<p>Johan BOURDAIS (Male) - IT Project Manager:</p> <p>Johan BOURDAIS is graduated in a master's degree in design of IT Systems. He has 15 years of experience in information systems and computer development and implementation planning in agile mode or V cycle.</p> <p>Experiences: project leader for the development of a mapping application for a HCC calculation study in the Accobams zone and monitoring of temperature and plastic waste at sea; project leader for the development of a vessel fleet tracking application identifying vessel routes and their passage through risk areas; project manager for the development of the Port La Nouvelle works monitoring platform and management and delivery of several environmental dashboard projects with real-time data monitoring.</p>
<p>Achraf DRIRA (M) - Data Scientist, Under water noise specialist:</p> <p>Achraf DRIRA is graduated in a PhD in acoustics, specialty Materials and Acoustics. He has 10 years of experience as a researcher, teacher, and engineer in these fields.</p> <p>Experiences: development of an application for predicting ship arrival times in the port of St-Nazaire ; development of a Big data platform, modelling of underwater noise and detection of areas at risk for marine mammals in the Accobams area; development of a monitoring application for Roro type boats in real time and estimation of waiting times in anchorage areas; development of an application to calculate the time of passage of ships in risk zones; customization of several acoustic monitoring platforms for works in the port of St-Malo, the Fécamp wind farm and the Trans Adriatic Pipeline.</p>
<p>Samuele TECCHIO (M) - Data Scientist:</p> <p>Samuele TECCHIO is graduated in a PhD in marine ecosystem modelling. He has 8 years of experience in scientific environmental monitoring.</p> <p>Experiences: contribution of expertise in marine biology, coding of processing algorithms, and assistance with data interpretation, as part of the preliminary studies for the future Saint-Nazaire and Dunkirk wind power plants (EDF); production of a rapid prototype dashboard for monitoring Ro-Ro vessels and their arrival times at the terminals. Facilitation of a co-construction workshop at the client's premises (Wallenius-Wilhelmsen) in New York; coding of 15 data science algorithms for environmental monitoring in Port-La-Nouvelle: water quality, air quality and airborne noise; design of a Dashboard for air quality monitoring and contextual data science, for the client Grand Port Maritime du Havre (Smart Port City).</p>
<p>David CLAUDE (M) - Architect and Expert in Security and Maintenance:</p>

<p>David CLAUDE is graduated in a degree in Engineering in Management Computing. He has 20 years of experience in IT, expert architect for Big Data solutions, Oracle and Cloudera Appliance Mastery, specialist in SQL and NoSQL databases</p> <p>Experiences: implementation of a Big Data platform within SINAY; Management of large and critical projects in Big Data; Implementation of the S.N.C.F.'s Big Data platform: testing and writing of procedures concerning the management of the base; Oracle and Cloudera Appliance; monitoring, backups and replication of critical objects and data; Implementation of application components; Writing of specific shells then encapsulation under \$U; Writing of processing chains.</p> <p>Cloudera trainer and expert: Installation and operation of an Oracle BigData Appliance; Administration of the Cloudera solution applied to the client context; HDFS optimization, YARN optimization and securing a Cloudera cluster.</p>
Relevant Projects
<p>Port Congestion optimization:</p> <p>A digital module which retrieves, stores and processes all of the data related to port calls, incoming vessels data and presents real-time measurements and AI based predictions in the form of graphical interfaces as well as real time alerts.</p>
<p>ETA prediction:</p> <p>A digital module that predict ETA based on historical AIS and meteocean data allowing to better organize port operations, optimize port calls and increase port efficiency.</p>
<p>Environmental monitoring:</p> <p>A digital module that carries out real time environmental monitoring of water quality, air quality and air acoustics. Real-time measurements are presented in an intuitive GUI. Real time alerts and automated reports are generated.</p>
<p>Underwater noise monitoring:</p> <p>A digital module that performs continuous monitoring of underwater noise levels and the presence of marine mammals in order to comply with regulations on the protection and conservation of the environment.</p>
Relevant publications and products
<p>SINAY HUB for Data access and information sharing - https://sinay.ai/en/sinay-hub/ Including comprehensive cloud agnostic SW stack.</p>
<p>Environment monitoring modules (air, water, underwater noise).</p>
<p>Logistics modules (ETA, route planning and optimization, fleet management, voyage and port calls optimization).</p>
<p>EMODnet and Copernicus databases, AIS historical data, 10 years of meteo data.</p>
<p>MAGLIO A. (2019),“Methodological guide guidance on underwater noise mitigation measures,” 7th Meeting of the Parties to ACCOBAMS Istanbul Turkey, 5 8 November 2019.</p>

Studio Itinerante Arquitectura SL - SIARQ	
Description of the organisation	
<p>SIARQ is a company from Barcelona specialized in the design and development of solar solutions for our cities. We commercialized with great success smart solar solutions to private companies and municipalities in Europe and diversified its activities in 2013 towards the development of a new generation of solar solutions for SMART CITIES. Nowadays SIARQ is a Clean Tech for Climate Company that is focused on the development and commercialization of Solar HUB, an innovative HUB combining a sustainable urban lighting solution and a complete infrastructure allowing to measure environmental data in cities: Solar HUB (www.solarurbanhub.com) is the first fully solar-powered hub for the provision of IoT-based services to cities and private companies. To answer its clients' needs, SIARQ counts with an international and multidisciplinary team in Spain and subsidiaries in Morocco and US, working enthusiastically with the aim to accelerate the transition of urban spaces to sustainable, connected Smart Cities.</p>	
Relevant skills/experience/technologies	
<p>SIARQ is a multidisciplinary team of industrial designers, architects, engineers, disruptive marketing professionals and business developers. SIARQ's skills are pretty much oriented on product and service creation and deployment. In the product part we develop specific solar modules, solar autonomous and grid connected systems, hardware and software development, IoT website and APP based platform development. Since 2003, SIARQ works in the integration of Solar Energy in architecture and urban spaces and since 2013 we participate in EC Funding projects in Consortium with tech centres, companies and Universities. We have concluded with success 4 European FP7 and H2020 projects in the past 8 years.</p> <p>SIARQ delivers to our customers Environmental Data as a Service that are visualized in our IoT interoperable digital platform, the URBAN BRAIN. SIARQ gathers this information thanks to SOLAR HUB an innovative infrastructure that measures environmental data in cities, combining sustainable lighting and generation of clean energy. Solar HUB is powered by the Sun and integrates IoT LoRaWan technology, LED lighting and AQI (Air quality Index) pollution sensors monitoring system.</p>	
Role in the project	
<p>Solar Hub is a new IoT and solar infrastructure that has the ambition to be the backbone of the environmental infrastructure of the Ports and Cities of tomorrow. The integration of Solar Hub and Urban Brain interoperable platform brings multi-layer values that can contribute to ACTIVITIES 1, 3, 4, 7 and 8.</p> <p>SOLAR ENERGY and LIGHTING: although the generation of sustainable energy is low compared to the energy consumed by a Port, SOLAR HUB technology is “per se” a solar solution able to generate enough green energy to make work the Solar Hub system itself (lighting, sensors and other electronic devices), thanks to a patented paraboloid module that harvest the solar energy from all the directions. SH can be autonomous or hybrid, depending on the need of each area. Contributing to ACTIVITY1 “Low emission energy supply and production”</p> <p>ENVIRONMENTAL DATA: this solution is the tool to develop effective plans of mitigation of air pollution in Ports against this severe limitation mentioned above. With sensors (NO₂, SO₂, O₃, PM_{2.5-10}, CO, CO₂ and noise) integrated in the SOLAR HUB infrastructure, URBAN BRAIN platform will be able to compare, thanks to Artificial Intelligent algorithms, all environmental data generated with other economic, political and social data. So, different Data Packages can be created: Live Data, Historical Data, Analytical Data, Predictive Data and Data for change. Then, customers will be able to know in any timeline, past present or future the air quality scenario. Contributing to ACTIVITY4 “Pilot digital activities” and ACTIVITY 8 “Masterplan for Future Green Port”.</p>	

IoT TECHNOLOGY: SOLAR HUB and URBAN BRAIN brings to the project the possibility to easily communicate through different protocols, send the information to the Cloud via LoRa, Sigfox, WiFi or other communication technologies. Satellite technology could also be implemented. Then the information could be displayed thanks to the dashboard in the URBAN BRAIN platform. Solar Hub units can be controlled remotely to establish bidirectional communication and creating visible alerts. APPs application can be also useful to the Port logistic management. **Contributing to ACTIVITY 4 “Pilot digital activities”.**

GREEN ENERGY FOR MOBILITY: Solar HUB is able to store additional energy besides the required to power the environmental sensors, electronic devices & lighting. Solar HUB might also charge electric vehicles (scooters, bikes, light weight vehicles, etc...) as well as other devices, for example, Drones to patrol the Ports. **Contributing to ACTIVITY 3 “Seamless efficient logistic operations”**

PEOPLE & VEHICLES FLOW:Traffic flow measurement technology can be integrated in Solar Hub to count people or vehicles that enter, exit or move around the Port and manage the flows in the area. On the other hand, presence sensors help to optimize lighting for energy efficiency. Monitoring this type of data help to monitor space and define security strategies for the Port. **Contributing to ACTIVITY 3 “Seamless efficient logistic operations”**

BOOSTING THE ECOSYSTEM:In our service consulting branch, called Positive Lab, we develop innovative business models where we integrate all the actors of an ecosystem to boost social, environmental and equal gender solutions. Our innovative models and strategic consultancy services help to co-create disruptive solutions.

Contributing to ACTIVITY 7 “Develop and promote multi actor governance” and ACTIVITY 8 “Masterplan for Future Green Port”

Key personnel

Alessandro CAVIASCA (M) - CEO & Cofounder:

Alessandro is a civil engineer, architect and resilient entrepreneur. He worked for important architecture firms developing sustainable buildings and urban planning. After receiving a seed capital, he founded SIARQ with the mission to develop sustainable solar-integrated architectural projects. In 2009 he licensed SIARQ solar products to Acuity Brands Lighting. Since 2013, he is totally focused in the growing of the company by deliver to customers optimized environmental services by using our smart and IoT connected solar lighting solutions for cities and urban spaces.

Axelle VERGÉS (F) - Executive Chairwoman & Cofounder:

Axelle is a businesswoman of New Generation, she graduated of Communication and Business. She co-founded SIARQ to foster, promote and develop business projects related to the fields of culture, society, and ecology. Along these years she created several innovative business tools to nourish the leadership of the company. Her current role is to guide the marketing strategy and dissemination events to promote the Solar HUB solution.

Angus ESS (M) - Deputy General Manager :

Angus is a creative individual who, as a ghost-writer, discovered that great stories are always at the heart of success. He is an expert in general management with a Bachelor's degree, Political Science and Government from the university of Singapore and a Master of Business Administration in MBA. He has been working as a founder and project director of a creative consultation startup. And as a creative head in Werks Solutions. Angus joined SIARQ as a general manager to align the strategy with the internal areas of the company.

Sarai GARRIDO (F) - Chief Operations Officer & Head of Design:

Sarai is Industrial Designer and got an MBA in Mexico City. She began her professional career in design and architecture firms developing urban furniture. For various years she was manager of the design and engineering departments of a design and manufacturing company developing seats for public spaces and has

<p>experience managing cross-functional teams. In 2017 she obtained a master degree in Product Design & Development in Barcelona. Sarai joined SIARQ since 2017 to develop new products and managing projects, as well as leading the manufacturing processes for the Solar HUB.</p>
<p>Anna VILLANUEVA (F) - Environmental expert :</p> <p>Anna is an environmentalist with a master's degree in renewable energy and sustainability. She has also acquired the title of Energy Auditor from the Faculty of Physics. Anna started her career auditing environmental impact of Can Pedro Foundation. Later, she focused on solar energy and developed a photovoltaic installation. With a sensitive mentality based on the general concept of sustainability and developing skills in environmental protection and sustainable energy management, Anna started collaborating in Siarq to implement the environmental strategy for the Solar HUB.</p>
<p>Jordi BINEFA (M) - Chief Technology Officer:</p> <p>Jordi is an expert in IoT, technology and communications. He is electronic engineer and has a Master degree in Telecom Engineering, with plenty experience developing hardware, firmware and software for integrated systems for different companies. He has been engineering professor in Jesuites del Clot School in Barcelona since 1992 and also leads the Master of IoT in Industry 4.0 in the UPC since 2019. Jordi joined SIARQ in 2016 to develop and implement the technological platforms and IoT systems to the Solar HUB.</p>
<p>Sara PUIG (F) - Software Development:</p> <p>Sara is a Software Developer by the Escola Jesuïtes el Clot in Barcelona, obtaining the best academic results in her class. Sara has developed successfully, in collaboration with Siarq, a project that integrated IoT into a real solution of the company to control lighting with a dedicated app. Sara has joined Siarq to continue the development of the software to interact with the Solar HUB, as well as the different apps for the final users.</p>
<p>Relevant Projects</p>
<p>Solar Design Consortium: The European Consortium of R&D SOLAR DESIGN funded by the Seventh Framework Program of the European Commission compiled a team to begin working in January of 2013. SIARQ was asked to be part of this team that over the course of three years, studied a new process for producing thin-film solar panels that allows you to develop customizable CIGS photovoltaic models adaptable to the desired voltage, power, size and shape. SIARQ take on the task of investigating applications of the new technology in the fields of the product integrated photovoltaic (PIPV) and building integrated photovoltaic (BIPV) from the conception to the final solution. Specifically, SIARQ developed a new generation of smart solar lighting products and a revolutionary photovoltaic module designed for the integration into the architecture of geodesic structures. All of this took place thanks to the agreement between different companies, research institutes, and universities across Europe including Spain, France, Germany, Austria, Denmark and Italy.</p>
<p>Participation in the KIC InnoEnergy FASCOM project. A cooperation between TECNALIA, SECE and Sunplugged. TBC...</p>
<p>STILORMADE CONSORTIUM developed the project; Highly efficient non-standard solar modules manufactured through an automated, reconfigurable mass production processes delivering 30% reduction in costs. SIARQ was awarded with the first prize to develop the Smart Solar streetlight TULIPAN.</p>
<p>Awarded with the Seal of Excellence for the Solar HUB project, with 13.5/15 in the framework of our last submission to the EIC Accelerator as A Disruptive Smart Infrastructure Enabling Light & Data as a Service. TBC.....</p>
<p>Relevant publications and products</p>

<p>Solar HUB: compact environmental monitoring hub, fully powered by sunlight that integrates environmental sensors to measure gases like PM2.5, PM10, CO, O3, NO2, SO2, among other parameters. Its patented dome-shaped photovoltaic module houses the sensors and communication devices and stores clean energy to power the devices. www.solarurbanhub.com</p>
<p>RMM: allows the connection and communication to the LoRa WAN Gateway in order to read data stored in the Cloud and show into developed applications</p>
<p>Urban Brain: digital and interoperable platform that sends data of the sensors to the Cloud and let the users monitor remotely the pollution in the air, get reports, alarms and make effective decision. Is the digital platform able to control, manage, monitoring and connect the lighting, the environmental sensors and other IoT devices of our system. The features developed include: development of a Bluetooth app; development of a digital twin system; telegram Alert System; sensor2Cloud PCB development; dashboard for data visualization; Integration of sensors with red light alerts.</p>
<p>Services: verify the progress of the different KPIs, helping customers to meet their objectives defined and reviewing their level of compliance.</p> <p>Attend emergencies as soon as possible and download environmental reports. It includes records accumulated over time and analysed to draw conclusions and be able to establish recurring patterns of behaviour to predict future trends. Urban Brain offers three types of environmental access within the platform. Urban Brain Lite, Prime and Consulting services.</p> <p>Graphs of different periods of time will be compared to review the levels of pollutants. This information will demonstrate the efficiency of the strategies performed to reduce the air pollutants in a city. Also, the data regarding location of the area monitored, will give valuable information of the possible sources of pollution to control or remove the emissions.</p> <p>Energy consumption of conventional urban infrastructures (streetlights, environmental monitoring stations, WiFi access points for the citizens and rechargeable stations) in comparison with clean energy delivered by Solar HUB to deliver environmental data, light, communication and clean energy. This way we could quantify the energy savings and consumption index that our solution could provide to the cities.</p> <p>Ensuring efficient traffic flows, low pollution levels, and sustainable activity is currently a challenge with no unique integrated monitoring system. The lack of common standards and interoperable solutions and the risk of fragmentation has been acknowledged by the European Commission as major challenges to the deployment and exploitation of the IoT potential. The Solar HUB contributes to solve this problem this through its integrated IoT sensors and tools that relay easy-to-understand and manageable information on the city performance to the user enabling temporary or permanent changes to be implemented. Also traffic flow measurement technology can be integrated in Solar Hub to count people or vehicles that enter, exit or move around the Port and manage the flows in the area. On the other hand, presence sensors help to optimize lighting for energy efficiency. Monitoring this type of data help to monitor space and define security strategies for the Port</p> <p>Solar HUB is able to store additional energy besides the required to power the environmental sensors, electronic devices & lighting. Solar HUB might also charge electric vehicles (scooters, bikes, light weight vehicles, etc...) as well as other devices, for example, Drones to patrol the Ports.</p>
<p>Infrastructures</p>
<p>Technical equipment to prepare electronic hardware for testing and deliver small productions (testers, soldering, electrical connections, power supply, etc.)</p>

Stock of electronic components, chips, controllers, batteries, different environmental sensor of NO ₂ , SO ₂ , PM2.5-10, CO, CO ₂ and O ₃ LED lighting, PV modules among others to develop functional prototypes of the technologies.
Molds for mass production of different components of our infrastructure: ABS-PMMA base and cap for Solar HUB, curved glass more efficient PV modules.
Outdoor laboratory to test PV modules, technological hardware, environmental sensors, communication software, and other IoT devices integrated in our developed systems.

Barcelona Supercomputing Center-Centro Nacional de Supercomputación	 Barcelona Supercomputing Center <i>Centro Nacional de Supercomputación</i>
Description of the organisation	
<p>The Barcelona Supercomputing Center (BSC) is a public research centre created in 2005 and devoted to enhance research in many different fields by providing HPC resources to different communities, and by directly generating knowledge in different areas, such as computing, earth, life sciences and Computer Applications in Science and Engineering. It hosts the MareNostrum 4, one of the PRACE (European supercomputing infrastructure) supercomputers BSC has over 600 staff members from more than 47 countries engaged in multidisciplinary scientific collaboration and innovation.</p> <p>BSC was selected in June 2019 by EuroHPC as one of the three institutions to host a pre-exascale supercomputer in the high-capacity supercomputer network that will operate in the EU by 2021.</p> <p>Most of BSC's research lines are developed within the framework of European Union research funding programs, and the center also does basic and applied research in collaboration with leading companies such as IBM, Microsoft, Intel, Nvidia, Repsol and Iberdrola. BSC believes in the importance knowledge transfer and technology developed at the center to industry worldwide, and promotes the use of HPC by local industry, as shown by licensing BSC's know-how and founding 4 spin-offs, one in the Life Sciences Department.</p> <p>BSC is a hosting member of the PRACE, HiPEAC, ETP4HPC. BDEC and BDVA and other international forums. The center develops technologies for Exascale within the BSC-led Mont-Blanc project and in joint research centers with Intel and IBM. BSC participates in 11 of the 14 CoE funded and lead 4 of them.</p> <p>The BSC Earth Sciences Department (ES-BSC) is structured around four groups (Climate Prediction, Atmospheric Composition, Computational Earth Sciences, and Earth System Services), with more than 100 employees, including technical and support staff. The department focuses on multiscale (global to urban) air quality and meteorological modelling, global and regional mineral dust modelling as well as global and regional climate modelling. The department has a wide experience in running operational atmospheric forecasting systems and delivering timely and quality forecasts, observations, information and knowledge to users. The ES-BSC currently hosts the CALIOPE air quality forecast system (http://www.bsc.es/caliope), the Barcelona Dust Forecast Center (http://dust.aemet.es/) and the WMO Regional Center Northern Africa-Middle East-Europe for the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) (http://sds-was.aemet.es/), and has developed the AIRE air quality forecast system for Mexico City in close collaboration with the Mexico City's Secretariat of the Environment (http://www.aire.cdmx.gob.mx/pronostico-aire/pronostico-calidad-aire.php). The department also facilitates knowledge and technology transfer of state-of-the-art research and develops services for renewable energy, urban development, infrastructure, transport, insurance, health and agriculture.</p>	
Relevant skills/experience/technologies	
<p>The ES-BSC department has a strong experience in the compilation of high-resolution emission inventories, as well as in the development of spatial, temporal and speciation profiles for creating air quality model-ready emissions. Regarding this last aspect, the ES-BSC has developed the CAMS-TEMPO emission temporal profiles in the framework of the current CAMS_81 service. The benchmarking of emission inventories and evaluation of emission datasets through air quality modelling is another strength of the group, which has</p>	

been proved through several projects and initiatives such as the EURODELTA III exercise or the FAIRMODE community

Role in the project

BSC will estimate emissions in the ports of study and define different emission scenarios of future implementations. By means of the in-house HERMESv3 emission system we will estimate port emissions of a Base Case scenario and future scenarios of atmospheric (NO_x, CO, SO₂, NH₃, PM₁₀, M_{2.5}) and GHG (CO₂, CH₄). AI methods and Automatic Identification System (AIS) data will be implemented to better define current ship emissions.

Key personnel

Albert SORET (M) - Group leader of the Earth System Services group:

Albert holds a PhD in Environmental Engineering from the Polytechnic University of Catalonia (Barcelona). He is the head of the Earth System Services group at the Earth Sciences Department of the BSC. The group hosts ~24 research engineers, physicists, social scientists, economists, communication experts, and air quality/climate researchers who try to bring the latest developments in Earth sciences to the society. He is a postdoc researcher with 15 years of experience in the areas of Air Quality and Climate. His main expertise includes emission, meteorological and air quality modelling, and climate services. His research facilitates technology transfer from local and national to international levels to advance sustainable development in key sectors such as urban development, infrastructure, energy, transport, health, and agriculture and water management. He is the principal investigator of the S2S4E project (EC-H2020), a member of the External Advisory Board of Clim2Power (ERA4CS), and Work Package leader within Clim4Energy (Copernicus), VISCA (H2020) and MAGIC (Copernicus). Dr Soret is also involved in several EC-FP7 and H2020 projects, and CAMS contracts: NEWA, EUPORIAS, SPECS, IMPREX, PRIMAVERA, CAMS95 and APPRAISAL. He coordinated the development of an air quality forecast system for Southern Spain-Andalucia and the Canary Islands. Furthermore, he has participated in the development of the Spanish air quality-related CALIOPE system for the Spanish Ministry and the air quality forecast system for the Mexico City's Environment Secretary. His work has resulted in 22 peer-reviewed publications, five chapters in books, proceedings, and reports, and more than 50 contributions to conferences/workshops/seminars. He is the supervisor of several postdocs and three PhD students.


Marc GUEVARA (M) - Postdoctoral researcher:

Marc holds B.S. in Industrial Engineering (Technical University of Catalonia, Spain, October 2010) and PhD in Environmental Engineering (Technical University of Catalonia, Spain, December 2014). He is a postdoc researcher with 6 years' experience in the areas of Emissions and Air Quality. His main expertise includes high resolution emission modelling (development, evaluation and improvement), air quality modelling, geographic information systems and environmental impact assessment. He is co-chair of the Emissions Working Group of the FAIRMODE community. He coordinated the development and implementation of an air quality forecast system for the Mexico City's Environment Secretary. He has participated in the Spanish air quality-related CALIOPE-And project and the FP7 Framework programme APPRAISAL, as well as in several national technology transfer projects related with air quality impact assessment. He has participated in capacity building and transfer of knowledge activities with technical people of the Environmental Ministry of Turkey (period of Execution: Jun 2013). He has coauthored 13 papers in international scientific journals and 8 communications to International conferences.

Carlos ALBERTO GOMEZ (M) - Postdoctoral researcher:

<p>Carlos is a STARS (MSCA-COFUND) postdoctoral fellow at the Earth Sciences department of the Barcelona Supercomputing Center (BSC-ES). He holds a Ph.D. in Science from the University of Liège (Belgium) where he carried out an interdisciplinary doctoral thesis at the interface of Computer Vision and Astrophysics. Before joining the BSC-ES, he worked as a "Research Chair in Data Science for Earth and Space sciences" at the Université Grenoble Alpes (France). With his multidisciplinary background at the interface of software development, machine learning and scientific data science, he joined the BSC-ES to establish a research line on Artificial Intelligence for Earth Sciences. This effort focuses on the development of machine and deep learning algorithms for topics, such as statistical downscaling and bias correction techniques, data-driven parameterisations, and the study of extreme climate events.</p>
<p>Relevant Projects</p>
<p>COPERNICUS service 2020/COP_066: Development of European emissions during the COVID-19 lockdown period. The propose of this service is to provide time, sector and country dependent European emission reduction factors attributable to the on-going COVID-19 pandemic so that they can be used to quantify the reduction of European primary emissions for both criteria pollutants and greenhouse gases.</p>
<p>COPERNICUS service CAMS-81: Global and regional emissions. This service will provide gridded distributions of anthropogenic (global and European domains) and natural and biogenic emissions (global only) in direct support of CAMS production chains and for CAMS data users.</p>
<p>COPERNICUS service CAMS-50 Regional production: The purpose of the Service will remain to produce numerical data and mapping products providing information on air quality and atmospheric composition on the European scale, with the aim of making it freely and easily accessible to the various user communities.</p>
<p>AQ-WATCH (H2020-870301): Air Quality: Worldwide Analysis and Forecasting of Atmospheric Composition for Health will develop a supply chain leading to the generation of seven innovative downstream products and services for improving air quality forecasts and source attribution.</p>
<p>Relevant publications and products</p>
<p>Guevara, M., O. Jorba, C. Tena, H. Denier van der Gon, J. Kuenen, N. Elguindi-Solmon, S. Darras, C. Granier, and C. Pérez García-Pando (2020) CAMS-TEMPO: global and European emission temporal profile maps for atmospheric chemistry modelling. Earth System Science Data Discussions, doi.org/10.5194/essd-2020-175.</p>
<p>Guevara, M., C. Tena, M. Porquet, O. Jorba and C. Pérez García-Pando (2020). HERMESv3, a stand-alone multi-scale atmospheric emission modelling framework – Part 2: The bottom-up module. Geoscientific Model Development, 13, 873-903, doi:10.5194/gmd-13-873-2020.</p>
<p>Gutierrez-Torre, A., J.L. Berral, D. Buchaca, M. Guevara, A. Soret and D. Carrera (2020). Improving maritime traffic emission estimations on missing data with CRBMs. Engineering Applications of Artificial Intelligence, 94, 103793, doi: 10.1016/j.engappai.2020.103793.</p>
<p>Petetin, H., D. Bowdalo, A. Soret, M. Guevara, O. Jorba, K. Serradell and C. Pérez García-Pando (2020). Meteorology-normalized impact of the COVID-19 lockdown upon NO₂ pollution in Spain. Atmospheric chemistry and physics, 20, 11119–11141, doi:10.5194/acp-20-11119-2020.</p>
<p>Guevara, M., C. Tena, M. Porquet, O. Jorba and C. Pérez García-Pando (2019). HERMESv3, a stand-alone multi-scale atmospheric emission modelling framework – Part 1: global and regional module. Geoscientific Model Development, 12, 1885-1907, doi:10.5194/gmd-12-1885-2019.</p>
<p>Infrastructures</p>

The BSC hosts the MareNostrum 4, a supercomputer based on Intel Xeon Platinum processors at 2.1 GHz from the Skylake generation. It is a Lenovo system composed of SD530 Compute Racks, an Intel Omni-Path high performance network interconnect and running SuSE Linux Enterprise Server as system. It consists of 48 racks housing 3456 nodes, each one equipped with 48 cores and 96Gb of memory (2Gb per core) (www.bsc.es/marenostrum/marenostrum).

Fine bubble Technologies	
Description of the organisation	
<p>FBT was established on December 14, 2017. The company is conducting research on the phenomenon of micro-nano bubbles (MNB) of gases in liquids and works on its applications in various fields. The main shareholder of the company is Dr Andrzej Mróz - author of 2 MNB generation methods among the 8 major in the world and an expert in the field of MNB applications. Dr A. Mróz has been researching and implementing this technology since 1996, initially at Warsaw University of Technology. Despite the short period of activity, FBT has achieved, among others: under the EU ACTTiVate program - grant for preliminary work on a carboxytherapy device, a method used in treatment of, among others, diabetic foot; as part of a consortium with Creotech Instruments SA, participates in a project for ESA entitled MOC_Cleaning_Device that relies on the development and construction of a device for molecular cleaning of satellite elements using MNB.</p> <p>FBT carries its own research and strongly cooperates with Warsaw University of Technology and Warsaw University, e.g. on applications of MNB in medicine, agriculture, industrial processes. FBT has a subsidiary company Water Bubble Technologies which was established on April 5, 2018. It implements the MNB technology in the area of water purification and wastewater treatment. From 01/25/2019 it implements a contract for one of the world leaders in the field of biogas plants for the construction of a sewage treatment facility for a biogas plant in Norway using the process of flotation with ozone MNB. Currently, WBT is working on a water treatment system cooperating with Warsaw University of Life Sciences.</p> <p>For the moment, both FBT and WBT are run by their two founders. They have an extensive experience in the fields of science and technology commercialization and management, including Jacek Kosiec's experience as CEO of Creotech Instruments, the leader of the Polish space sector. The strategy of FBT aims at developing a portfolio of solutions for various market sectors, building upon the MNB technology. It is not limited to a couple of solutions the companies could build themselves, but rather spread the basic technology to many application areas through co-operation with specialised solution providers or spinning off SPVs and subsidiaries.</p>	
Relevant skills/experience/technologies	
<p>The MNB technologies are little known in Europe. We are aware of some research being done at Delft University of Technology (TU Delft) and University of Twente in the Netherlands, as well as at Norwegian University of Science and Technology in Trondheim. Individual commercial applications have been developed in the UK, Germany, Norway and Sweden, while some new initiatives have started in Spain and Portugal. In Poland, Dr Andrzej Mróz has accumulated extensive experience in the UFB technologies and developed knowledge exchange contacts or more advanced links with MNB pioneers (mostly Japanese), including FBIA, and most of the European entities mentioned above. Independently, since 1996 Dr Mróz has been developing his proprietary bubble generation technologies, which gives us the freedom to apply them in various areas without recurring to the Japanese patents.</p> <p>Fine Bubble Technologies has its original technology of the ultrafine bubble generator at its disposal and a broad knowledge on other generators developed mostly in Japan. It has been implemented in the prototype device for the space sector and sewage treatment installation. These foundations will make our solution competitive and easier to deploy in significant quantities. At the same time, our effort put into the generator development will serve multiple application areas in parallel. Together, FBT and WBT employs 8 people, including 2 PhD and 5 engineers who have a unique know-how on MNB generation and applications. The companies share the same facility in the TDP Industrial Park in Piaseczno, a Warsaw suburban which allows</p>	

for laboratory experimental work and testing of equipment. Most of mechanical and electrical works is subcontracted to specialized companies in the TDP IP.

Role in the project

Fine Bubble Technologies Ltd. is proposing application of water with micro- nanobubbles (MNB) of gases such as O₂, O₃, N₂, CO₂ in port operations which would enable cleaner operational processes, lower energy consumption and lower CO₂ emissions.

Applications of MNB technology for ports include:

Cleaning of ships, containers and port equipment by water with MNB of ozone or just air without detergents, or with a very limited amount of detergents has been proved to work efficiently in Japan or South Korea, e.g. for bridges, tunnels and similar constructions;

Wastewater and sewage treatment – FBT has developed its own technology for sewage treatment based on the flotation process, not a sedimentation predominantly used in Europe. An example of such installation has just been started in Lillehammer, Norway. There are also two examples in Poland.

Cleaning of ballast water from ships – the ships have to get rid of ballast water in ports and it is a cause of pollution, both a chemical one and a biological one. MNB technology allows for efficient cleaning of ballast water and its recycling.

Water cleaning in ports – it has been proved, e.g. by Yokohama or Busan ports that it is possible with the MNB technology to obtain clean water in ports with natural life coming back.

Coal dust or other dusty materials in the port air diminution – it is possible to decrease the level of dust in ports caused by transshipment of dusty materials using MNB technology and fog generators. Combining water fog and MNB allows not just for removing the dust from air but also from surfaces and elimination of harmful fumes thanks to oxidation of small particles. Then MNBs can be used for treatment of wastewater of this process to avoid pollution of water in the port; and

A more ecological fuel for ship engines - it is possible to produce a stable diesel - water dispersion which is more ecological than a diesel alone. The level of NO_x can be decreased significantly in this way. Such a fuel can be used without changes of ship engines.

Key personnel

Andrzej MROZ (M) – PhD:

Andrzej was for 24 years a researcher at the Faculty of Chemical and Process Engineering of Warsaw University of Technology. He also worked for numerous foreign companies, e.g.: Salsnes Filter (Norway), Bokela GmbH (Germany), Reckitt Benckiser, Compteurs Magnol (France). Research on the production of MNB in Poland was initiated by Dr. A. Mróz at the Warsaw University of Technology in 1996 year. Since then A. Mróz worked many years on development of innovative technologies based on use of MNBs in liquids. For almost 12 years, he has been actively cooperating with Japanese and Taiwanese, Korean and Chinese companies, and in 2016 he established direct cooperation with the FBIA (Fine Bubble Industries Association), which gives him direct access to the most modern technologies in this field, offered by over 70 FBIA members from Japan and other countries. He is a co-founder of Fine Bubble Technologies and Water Bubble Technologies.

Alicja MATUSZEWSKA (F) - PhD.:

Alicja completed education at Warsaw University of Technology, Faculty of Chemistry. Her work experience includes internships at Agency for Science, Technology and Research, Singapore and Charles University in Prague, Czech Republic. She is a co-author of scientific publications: 1. A. Adamczyk et al., Dehydration of ortho-, meta- and para-alkoxy phenylboronic acids to their corresponding boroxines. Eur. J. Inorg. Chem., 2018, 13, 1942; 2. A. Matuszewska et al., Glucose-Responsive Hybrid Nanoassemblies in Aqueous Solutions: Ordered Phenylboronic Acid within Intermixed Poly (4-hydroxystyrene) -block-poly

(ethylene oxide) Block Copolymer, Biomacromolecules, 2015, 16, 3731. She realised multiple R&D project, e.g. on designing and implementation of new innovative products based on new materials or reduction of energy consumption by various processes.

Karol ULATOWSKI (M) - MSc Eng.:

Karol completed MsC studies at the Faculty of Chemical and Process Engineering of Warsaw University of Technology. He participated as an intern in the research of the team of prof. Robert Hołyst on the subject of death of microorganisms as a result of interaction with zinc oxide nanowires and produced silica nanoparticles for interaction studies with microbiology. He also obtained the biotechnology education at the Faculty of Chemistry which marks him as a person experienced in the study of the interaction of living matter with nano-objects. His PhD thesis, which is under preparation, concerns the issues of stability and production of micro- and nanobubbles in liquids, the works are carried out at the Faculty of Chemical and Process Engineering of WUT.

Paweł LANKIEWICZ (M) - MSc Eng.:

Paweł completed MsC studies at the Faculty of Chemical and Process Engineering of Warsaw University of Technology. He is specialized in environmental protection processes engineering. He has been employed at Water Bubble Technologies as a design engineer since September 2018 year. He implemented a project to build a sewage pre-treatment plant for a biogas plant in Lillehammer, in which it was used flotation with micro nano ozone bubbles. As part of the project, he was responsible for the 3D installation design and ordering and completing devices and supervised installation works. Has experience in designing various type of devices generating nanobubble dispersions. He checked the efficiency of generation for various systems in different working conditions. He conducted pilot studies of wastewater treatment and water treatment.

Piotr WYREBIAK (M) - MSc Eng.:


Piotr WYREBIAK completed MsC studies at the Faculty of Chemical and Process Engineering of Warsaw University of Technology specializing in the field of bioengineering. He has been employed at Water Bubble Technologies as a design engineer since June 2019. He implemented a project of a sewage pre-treatment plant for a biogas plant in Lillehammer, where it is used flotation of micro-nano bubbles with ozone. He has experience in the construction of generating devices dispersion of gas in liquid. He has conducted wastewater treatment tests for various clients in Europe. He was responsible for the engineering and technical side of a project implemented for the European Space Agency on washing optoelectronics using nanobubble technology.

Jacek KOSIEC (M) - MSc.:

Jacek graduated from University of Warsaw in the field of physics of elementary particles. He also completed postgraduate study on commercialization of science and technology acc. to IC2 Institute, Univ. of Texas programme. In the years 1986–95 he worked at the University of Warsaw, at the Goethe University in Frankfurt and at the Max Planck Institute, participating in experiments at CERN. During his career J. Kosiec gained unique experience in high-tech projects, e.g.: he cooperated with the Nobel laureate, prof. G. Charpak, worked on modelling the technology commercialization process, initiated creation of Warsaw University Technology Transfer Centre and the Płock Industrial and Technological Park; was a pioneer of the Internet in Poland. J. Kosiec is a co-founder of 6 startups and the author of over 100 expert opinions in the area of organization, management and microeconomics of enterprises. Presently, he is CEO of Creotech Instruments, the leader of the Polish space industry.

Relevant Projects

Under the EU ACTTiVate program - grant for preliminary work on a carboxytherapy device, a method used in treatment of, among others diabetic foot.
Together with Creotech Instruments SA, FBT participates in a project for ESA: MOC_Cleaning_Device that relies on the development and construction of a device for molecular decontamination of satellite elements based on MNP.
FBT performed works on R&D on flotator unit and water purification / sewage treatment technology based on ozone MNB for a biogas plant – with daughter company Water Bubble Technologies.
Relevant publications and products
The relevant products include: a flotator unit and water purification / sewage treatment technology based on ozone MNB; device for molecular decontamination that is using MNB; A disinfection system using water fog with MNB.
Ulatowski, K., Sobieszuk, P., Mróz, A., & Ciach, T. (2019). Stability of nanobubbles generated in water using porous membrane system. Chemical Engineering and Processing - Process Intensification, 136(July 2018), 62–71. https://doi.org/10.1016/j.cep.2018.12.010
Ulatowski, K., Maciejewska, A., Mróz, A., & Sobieszuk, P. (2018). Investigation of the physicochemical properties of nitrogen micro- and nano-bubbles dispersion in liquids. Chemical Engineering and Apparatus, (3), 84–85. https://doi.org/10.1002/cphc.201700010
Ulatowski, K., & Sobieszuk, P. (2018). Influence of liquid flowrate on size of nanobubbles generated by porousmembrane modules. Chemical and Process Engineering, 39(3), 335–345. https://doi.org/10.24425/122954
Ulatowski, K., & Sobieszuk, P. (2020). Gas nanobubble dispersions as the important agent in environmental processes – generation methods review. Water and Environment Journal, 0(2012), 1–19. https://doi.org/10.1111/wej.12577
Ulatowski, K., Fiuk, J., & Sobieszuk, P. (2020). Sterilisation of nanobubble dispersions. Chemical and Process Engineering, 41(1), 69–76. https://doi.org/10.24425/cpe.2019.130224
Infrastructures
Office – 274 m2
Wet lab – 24 m2
Workshop with basic mechanical and electrical equipment – 8 m2
Special equipment: Nikuni pumps, spargers - MNP generation Water Demineralizer - Creation of ultrapure water Ozone, redox and oxygen potential meters - Quality control of NP dispersion Blue Planet ozone generator - Ozone generation 2 heads for generating water + NP dispersion - for generating the agent cleaning spray 2 lab models of flotation units for water treatment and wastewater treatment Lab system for testing liquid dispersion and MNB

Wartsila Voyage Limited	
Description of the organisation	
<p>Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. By emphasizing sustainable innovation, total efficiency and data analytics, Wärtsilä maximizes the environmental and economic performance of the assets of its customers.</p> <p>Wärtsilä's purpose is to enable sustainable societies with smart technology. The demand for clean and flexible energy and the need for efficient and safe transportation are increasingly affecting the way that customers operate. This forms the basis for Wärtsilä's offering of smart solutions to the marine and energy markets. With an integrated portfolio of services, systems and products, the company is well positioned to respond to the demand for energy efficient and innovative solutions. The emphasis is placed on optimizing installation performance throughout the lifecycle, using data analytics and artificial intelligence to support customers' business decisions. Wärtsilä's digital transformation will provide increased customer value through a new era of collaboration and knowledge sharing.</p>	
Relevant skills/experience/technologies	
<p>Wartsila Voyage is the ideal partner for advanced simulator project as our company combines all required competences, in-house developed cutting-edge simulation software and development capacities, high flexibility in simulation layout and configuration, long year experience in the simulation market with steadily growing market shares and remarkable recent projects completed not only in Europe but also world-wide with a constant high quality level. Ecosystem optimization simulations based on hi-fidelity hydrodynamic ship, bathymetric area modelling and mathematical engine modelling. Emission and fuel consumption data gathering and benchmarking, providing voyage and JIT arrival optimization</p>	
Role in the project	
<p>Wartsila will participate under WP 2, and in particular under WP2.5 in collaboration with UNIGE in order to simulate the ship/boat related energy flows.</p> <p>In addition, Wartsila will perform the demonstrations at Fellow port (Limassol) under WP3.6. As requested by port's needs, Wartsila Voyage will propose an integrated simulator environment that would allow to evaluate efficient way of executing ship voyage, port approach and port resource utilization. The solution would bring together multiple stakeholders (ship operator, ship crew, port operator, pilot, etc.) into an integrated digital collaboration environment for planning and decision making with AI decision support capabilities.</p>	
Key personnel	
<p>Johan EKVALL (M) - Solution & Business Development Director: Johan has 15 years of experience in maritime simulations. Having worked in both Product Management and Business Development, Johan will use his experience to coordinate the tasks within the Wärtsilä scope, but also contribute directly in the execution of the project simulation runs. Johan holds a BSc in Shipping & Logistics and has served 10 years as an officer in the Royal Swedish Marines</p>	
<p>Dmitry ROSTOPSHIN (M) - General manager, Ship Traffic Control: Having worked in Monnalisa project, STM project developing new advanced solution for maritime industries.</p>	
Relevant Projects	

STM Validation (2015-2019) The STM Validation Project demonstrated the STM concept in large-scale test beds in both the Nordic and Mediterranean Seas. The key strategic enablers of STM (Sea Traffic Management) was tested and validated. The project encompasses: 300 ships, 13 ports, 5 shore-based service centres, 13 connected simulator centres' in the European Maritime Simulator Network – EMSN. STM-services allow personnel on-board and on shore to make decisions based on real-time information. These services enable more just-in-time arrivals, right steaming, reduced administrative burden and decreased risk related to human factors. Example of services are: route optimisation services, ship to ship route exchange, enhanced Monitoring, port Call Synchronisation, winter Navigation. STM's aim is to create a safer, more efficient and environmentally friendly maritime sector. The goals for full deployment of STM by year 2030 in relation to year 2015 are the following: Safety: 50% reduction of accidents; efficiency: 10% reduction in voyage costs and 30% reduction in waiting time for berthing; environment: 7% lower fuel consumption and 7% lower greenhouse gas emissions.

BALT SAFE (January 2019 -December 2021) The STM BALT SAFE project aims to increase the safety of navigation by introducing common Sea Traffic Management (STM) which enables maritime services to digitally exchange voyage plans of tanker traffic in the Baltic Sea.

Tanker safety

The Baltic Sea experiences one of the densest sea traffic in the world. With many tanker and passenger crossing routes as well as narrow passages, the risk of accidents is high. Following HELCOM recommendations, and in order to increase the safety of navigation, the project STM BALT SAFE provides Sea Traffic Management (STM) services to the tanker traffic. The services enable the exchange of voyage plans between ships, and between ships and shore.

Shore support

The exchange of information and integration of STM functionalities improves an overall situational awareness of traffic among tankers and shore centres around the Baltic Sea. The shore centres develop and test new digital services, for example automated reporting, which additionally improve speed and accuracy of ship-shore information exchange.

EcoShip (2010-ongoing) Wärtsilä and Rörvik Safety Center (Norway) designed and developed a training concept called EcoShip which is supposed to change the mindset of officers and open their eyes to that part of the problem that they can do something about.

Training with the help of the environment simulator EcoShip offers an educational and realistic way to show correlation between different types of vessels handling and discharge of emissions to air. Environment simulator has different functionalities, the most important being: emulate various types of vessel (ferries, speed boats, etc.); measure the speed and time spent; measure the fuel consumption in real time, total and average; measure the emissions of NOx, SOx, CO2 and HC; store the simulations for the debrief of the course participants.

4.2. Third parties involved in the project (including use of third party resources)

Beneficiary # FineBubble	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<i>The participant plans to subcontract some mechanical works requiring special machining of parts, especially made of stainless steel. Similarly, some electrical works and assembly are planned to be subcontracted. Measurements of MNB require special equipment which FBT is planning to purchase, however presently such services are also subcontracted.</i>	
Does the participant envisage that part of its work is performed by linked third parties ²	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

Beneficiary # UNIGE	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<i>Task 2.1. The energy audit will be conducted by the spin off IESolutions that in accordance to EN 16247 standards, Energy Efficiency Directive (2018/2002/UE), to define an Energy Management System in line with the European/International Standard EN ISO 50001:2011.</i>	
Does the participant envisage that part of its work is performed by linked third parties ²	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

Beneficiary # FACTUAL	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
N/A	
Does the participant envisage that part of its work is performed by linked third parties²	Y
<i>NEMI MOBILITY SOLUTIONS is a technological platform that allows to manage and optimize public transport in low-density areas, providing flexible management tools for mobility services to make the more efficient, sustainable and inclusive. FACTUAL is the owner of 10% of NEMI MOBILITY SOLUTIONS. NEMI MOBILITY SOLUTIONS will provide their technological platform to be tailored for the mobility between port and the city including a) inclusion of bus and shared electric vehicles and b) host the calculation engine for micro-subsidies. These evolutions will be tested and demonstrated in two ports.</i>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	Y
<i>PARKUNLOAD, SL (PIC: 907655773) is an advanced digital platform to regulate, control and monitor loading zones and other restricted parking areas, based on IoT devices and mobile applications with the aim of improving logistic operations. PARKUNLOAD will test the "smart park zone" in different locations of the lighthouse port in order to improve the externalities coming from an intense traffic of international heavy trucks by a process of digitalisation to properly manage truck drivers within its parking and dock areas.</i>	
Does the participant envisage that part of the work is performed by International Partners³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

Beneficiary # EUROGATE CONTAINER TERMINAL LIMASSOL LTD	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<i>Eurogate will acquire services for an environmental monitoring system. The systems will be outsourced since the purchase of systems will most likely not make financial sense for the duration of the project.</i>	
Does the participant envisage that part of its work is performed by linked third parties²	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

Beneficiary # CNRS	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
N/A	
Does the participant envisage that part of its work is performed by linked third parties²	Y
<p><i>The Molecular and Atmospheric Spectrometry Group (GSMA) is a joint research unit between the CNRS and the University of Reims Champagne-Ardenne (URCA). URCA will be involved as a Linked Third Party to CNRS under clause 14 of the MGA, since some permanent staff involved in the project and working in the GSMA are employed by the URCA.</i></p> <p><i>The Laboratory for Sciences of Climate and Environment (LSCE) is a joint research unit between the CNRS and the French Alternative Energies and Atomic Energy Commission (CEA) and the University Versailles Saint-Quentin-en-Yvelines (UVSQ). CEA will be involved as a Linked Third Party to CNRS under clause 14 of the MGA, since some permanent staff involved in the project and working in the LSCE are employed by the CEA.</i></p>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

Beneficiary # Hugo Grotius gGmbH	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p><i>Video production (30 000 Euros) The suggested sub-contract is intended for the technical production of a video on the legal aspects of greening ports by a video production company which has not been identified yet. This would be a deliverable for WP6.1. including some (not too complex) animations, licensing of pictures and music, professional speaker, recording and cutting, etc.</i></p> <p><i>In addition, HGG under WP6 is foreseen to a sub-contractor for WP6.1.2 "IT Law, Data Protection Law and Intellectual Property Law" regarding Copernicus and Galileo regulation aspects (47,6 Euros).</i></p>	
Does the participant envisage that part of its work is performed by linked third parties²	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners³ (Article 14a of the General Model Grant Agreement)?	N
N/A	

5. Ethics and Security

5.1.Ethics

Research activities proposed under GREENING PORTS do not involve any particular Ethics issues mentioned. All research activities developed by The Cyprus Institute, Università degli Studi di Genova, Klaipedos Universitetas, the Center for research and technology Hellas, the Centre National de la Recherche Scientifique, and Hugo Grotius gGmbH are organised in accordance with the Charter of Fundamental Rights of the EU, the Declaration of Helsinki, the Ethical Principles of the H2020, and the related national laws of the participating countries.

The project assumes the privacy preservation and data protection responsibilities in the framework of the European General Data Protection Regulation (GDPR). The GDPR introduces responsibility and accountability for data processing, with certain technical implications.

The protection of the personal data will be ensured by the consortium, in the Consortium Agreement, since all partner organisations managing data have in place their own data privacy and security policies which are compliant with EU legislation and European General Data Protection Regulation (GDPR 2016/679).

Participation mechanisms using in this project are compliant with the current regulation. Partners involved in the design of events and other participatory activities have developed internal mechanisms to ensure privacy and confidentiality of the personal data.

The data management plan, also presented in WP0 will detail the project's data management policy on privacy, data collection, storage, protection and exploitation in line with the law GDPR 679/2016. We shall also foresee an Ethical charter on data collection and exploitation.

An Ethical Committee will be also established and will provide informed opinions and ethical audits on any ethical questions arising from the projects' activities, verifying their compliance to the standards requested by the current legislation, etc.

A Data Protection Officer will be also appointed to cross-check any project developments from the perspective of data protection, ensuring the respect of the current European and national legislation regulating the protection of personal data. All the procedures and data-related documents will be described in the data management plan.

5.2.Security

5.2.1. Results with a security recommendation

The data managed by the GREENING PORTS platform will be accessible through the access rights defined at user profile level. During the specifications phase, the access rights matrix will be specified and shared with the European Agency for approval.

5.2.2. Classified information

No classified information is managed by the GREENING PORTS platform.

5.2.3. Activities involving dual-use goods or dangerous materials and substances

The research activities proposed under GREENING PORTS do not involve any dual-use goods nor dangerous materials and substances.

6. Annexes

ANNEX I

Table of Acronyms

AI	Artificial Intelligence
API	Application Programming Interface
AP	Air Pollution
AP	Advisory Panel
BGS	Blue Green Solutions
BM	Business Model
B2P	Business to People
CAMS	Copernicus Atmosphere Monitoring Service
CC	Climate Change
CDM	Configuration and Data Manager
CEF	European Training Center. French acronym
CH4	Methane
CO2	Carbon Dioxide
CSFs	Critical Success Factors
DRT	Demand Responsive Transport
DTM	Drone Traffic Management
EC	European Commission
EGNSS	European Global Navigation Satellite Systems
EI	Expected Impacts
EMAS	European Eco-Management and Audit System
EO	Earth Observation
ESPO	European Sea Ports Organisation
ETS	Emissions Trading Scheme
EU	European Union
GDPR	General Data Protection Regulation
GNSS	Global Navigation Satellite Systems
GHG	Greenhouse Gases
ICT	Information and Communications Technology
IMO	International Maritime Organization
IoT	Internet of Things
IP	Intellectual Propriety
IPR	Intellectual Propriety Rights
IRR	Internal Rate of Return
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
LCE	Life Cycle Engineering system
LNG	Liquefied Natural Gas
MaaS	Mobility as a Service
MVP	Minimum Viable Product
NBS	Nature Based Solutions
NH3	Ammonia

NO2	Nitrogen Dioxide
NOx	Oxyde d'Azote Nox
PAO	Project Assurance Officer
PH	Public Health
PI	Program Increment
PM	Particulate Matter
PPM	Parts Per Million
PV panel	Photo-Voltaic Panel
QEMS	Quality and Environmental Management System
QMS	Quality Management System
ROI	Return On Investment
SaaS	Software as a Service
SAFe	Scaled Agile Framework
SDGs	Sustainable Development Goals
SME	Small and Medium-sized Enterprise
SO2	Sulphur Dioxide
TENT	Trans European Networks
TEU	Twenty-foot Equivalent Unit
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle
UHI	Urban Heat Island
UM	Urban Mobility

ANNEX 2

Detailed Internal Deliverables due under WP2 Service Implementation

Deliverable	Deliverable name	Leader	Type	Delivery date (in months)
WP2.1				
D2.1.1	feasibility study for hybrid workboat, hybrid sewage tanker and electrical ferries	KU	R	M18
D2.1.2	green buildings energy solutions	AT	R	M18
D2. 1.3	green cold ironing	UNIGE	R	M18
D2. 1.4.1	low carbon energy production and storage	AT	R	M12
D.2.1.4.2	Evaluation of solar energy efficiency and CO2 emissions saved of the Solar Unit Hub delivered to the Port,	SIARQ	R	M12
D2.1.4.3	energy chain simulation platform	AT	OTHER (Software)	M18

D.2.1.4.4	Analysis of the number of light vehicles charged	SIARQ	R	M42
D.2.1.5	port demonstration cases assessment and evaluation	UNIGE	R	M24, M54
WP2.2				
D.2.2.1	Operational, economic and social assessment for the introduction of smart logistics tools	UNIGE	R	M11
D.2.2.2	Models and tools for the planning of port logistics operation	CG	R	M24
D.2.2.3	Models and tools for scheduled daily operations, <i>with support of SINAY</i>	UNIGE	R	M32
D.2.2.4	DSS for port logistics operations	UNIGE	OTHER	M44
D.2.2.5	adaptation and application of the DSS in port demonstrations	UNIGE	R	M54
D.2.2.6	impacts of smart contracts in the smart logistics operations and guidelines for the effective introduction of smart contracts	UNIGE	R	M48
D.2.2.7	Technology acceptance evaluation	UNIGE Support CERTH	R	M36
WP2.3				
D.2.3.1	Local Transport Logistics Network and port-city relation	UNIGE	R	M18
D.2.3.2	Seamless logistics' cascading impacts on stakeholder and port services	CERTH	R	M24
D.2.3.3	Traffic models and tools: macro perspective	CG	R	M32
D.2.3.4	Traffic models and tools: micro perspective	UNIGE	R	M32
D.2.3.5	DSS for port traffic flows	CG DEMS	OTHER	M44
D.2.3.6	Report on adaptation and application of the DSS in port demonstrations	UNIGE	R	M54
WP2.4				
D.2.4.1	On-demand transport platform tailored for ports	FCT	OTHER	M18

D.2.4.2	Smart park zones for trucks tailored for ports	FCT	OTHER	M18
D.2.4.3	Mobility Plan for ports	FCT	R	M42
WP2.5				
D.2.5.1	Simulation test cases definition	UNIGE	R	M18
D.2.5.2	Simulation result, with contribution DNVGL	UNIGE	R	M30
D.2.5.3	Availability & Supportability results	UNIGE	R	M30
D.2.5.4	DSS real time waterborne traffic optimization web platform	ONAIR	OTHER	M36
D.2.5.5	Databases/tools connectors,	DEMS	OTHER	M36
D.2.5.6	Energy management optimizations	DEMS	R	M36
D.2.5.7	Software, Ship navigation & emission simulator	WSTL	OTHER	M40
WP2.6				
D.2.6.1	Water & Noise Pollution Monitoring Services	SINAY	R	M30
D.2.6.2	Air Pollution & GHG Monitoring and Mapping Service	CyI	R	M24
D.2.6.3	Model-based Emission Inventory	BSC	R	M54
WP2.7				
D.2.7.1	Monitoring architecture	CG	R	M18
D.2.7.2	Network infrastructure architecture	UNIGE	R	M24
D.2.7.3	Computational infrastructure architecture	UNIGE	R	M18
D.2.7.4	Cyber security management architecture	UNIGE	R	M30
D.2.7.5	Final global ICT architecture	UNIGE	R	M54

ANNEX 3

Members of the Advisory Panel (Letters of Intent) and Letters of Support

Members of the Advisory Panel (Letters of Intent)

Name	Organization/ position
Bogdan Oldakowski	Baltic Ports Organisation, Secretary General
Novikas Mindaugas	AB Klaipedos nafta, CFO
Diego Pavia	EIT – KIC InnoEnergy SE, CEO
Nikitas Nikitakos	University of Aegean, Professor
Daniel Serra Segarra	EIT – Urban Mobility, Director of South Hub
Jean-Marc Charbonnier	CNES, Direction de l’Innovation, des Applications et de la science, Sous-Directeur Adjoint
Jorge-A. Sanchez-P.	si-Cluster, Chairman
Alexios Birbas	University of Patras, Dpt of ECE, Professor
Jaroslaw Niewinski	Polish Air Navigation Services Agency, Director

Letters of Support

Name	Organization/ position
Phobe Koundouri	EIT Climate – KIC Hub Greece, Director
Cinzia Zincone	North Adriatic Sea Port Authority, Special Commissioner
Vassilios Makios	Corallia incubator, General Director
Panagiotis Tsonis	Patras Port Authority SA, Managing Director
Rimgaudas Spokas	Lithuanian Environmental Protection Agency, Director
Saulius Kerza	Lithuanian Ministry of Transport and Communications, Chancellor of Ministry
Andrey Moshkov, Director	Federal State Unitary Enterprise ‘Rosmorport’ North-Western basin branch Kaliningrad Authority
Jean-Pierre CHALUS	Union des ports de France
Li Guangxue	Ocean University of China, Science and technology research

NOTE : In some cases, restriction to office work, due to Covid-19, made difficult to recover the organisation’s stamp.



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF INTENT

Organisation: Baltic Ports Organization

Title, surname and name of representative: Bogdan Oldakowski

Function: Secretary General

Address: 8 Pułaskiego Street

City code: 81-368

City: Gdynia

Country: Poland

Phone number: + 48 58 627 24 27

Email address: bpo.sg@actiaforum.pl

Gdynia, 21/12/2020

By this Letter, we express our intention to support the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020: Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

In particular, we declare **our interest in becoming member of the Advisory Panel**, foreseen under the Replicability and Cooperation activities. We therefore commit to **follow the activities of the Advisory panel**, by attending its annual (virtual) meetings and providing feedback should it be necessary. We also agree on supporting the dissemination of the projects' activities and results to our network, with a particular focus on promoting the innovative uptakes of the suggested solutions and technologies.

Stamp of the organisation



Signature



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: AB „Klaipėdos nafta“

Title, surname and name of representative: Mindaugas Navikas

Function: CSO

Address: Burių g. 19, Klaipėda

City code: LT-92276

City: Klaipėda

Country: LITHUANIA

Phone number: +370 686 49814

Email address: m.navikas@kn.lt

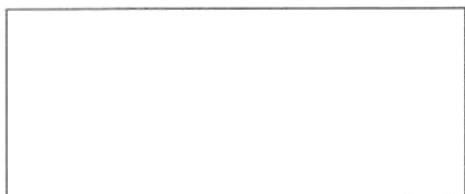
Klaipėda, 14/01/2021

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

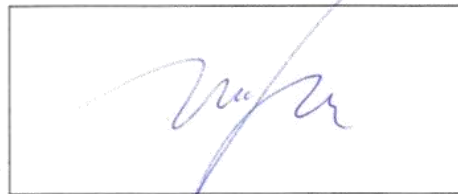
We support this proposal, with the ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**, led by Capgemini with the support of a very **strong and competent Consortium** and invests in a plethora of activities focusing on a fast, **reliable and sustainable transition**. This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature





LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF INTENT

Organisation: KIC InnoEnergy SE
Title, surname and name of representative: Diego PAVIA
Function: CEO
Address: John-F-Kennedylaan 2
City code: 5612AB City: Eindhoven Country: Netherlands
Phone number: +31 40 240 60 31 Email address:
info@innoenergy.com

Eindhoven, 18/01/2021

By this Letter, KIC InnoEnergy SE (hereafter: "KIC SE" or "we") expresses its intention to support the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

In particular, we declare our interest in becoming member of the **Advisory Panel**, foreseen under the Replicability and Cooperation activities. We therefore commit to follow the activities of the **Advisory panel**, by – as much as is possible, also taking into account our other activities – attending its annual (virtual) meetings and providing feedback should it be necessary. We also agree on supporting the dissemination of the projects' activities and results to our network as long as such dissemination continues to be in line with our company objective (promoting market uptake of innovative sustainable energy solutions) and in particular our strategy on green ports.

Yours sincerely,



(Diego Pavia, CEO)

12



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF INTENT

Organisation: University of the Aegean

Title, surname and name of representative: Dr. Nikitas Nikitakos

Function: Professor

Address: Korai 2a

City code:18510

City:Chios

Country: Greece

Phone number:+302271035268

Email address: nnik@aegean.gr

Chios, 30/12/2020

By this Letter, we express our intention to support the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

In particular, we declare **our interest in becoming member of the Advisory Panel**, foreseen under the Replicability and Cooperation activities. We therefore commit to **follow the activities of the Advisory panel**, by attending its annual (virtual) meetings and providing feedback should it be necessary. We also agree on supporting the dissemination of the projects' activities and results to our network, with a particular focus on promoting the innovative uptakes of the suggested solutions and technologies.



Stamp of the organisation

Signature

A handwritten signature in black ink, consisting of stylized, overlapping letters.



European Institute of
Innovation & Technology



A body of the European Union



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF INTENT

Organisation: EIT URBAN MOBILITY INNOVATION HUB SOUTH S.L

Title, surname and name of representative: Serra Segarra, Daniel

Function: Director

Address: Diagonal 211, planta 27

City code: 08018 City: Barcelona Country: Spain

Phone number: +34 685 658 319 Email address: daniel.serra@eiturbanmobility.eu

Barcelona, 08/12/2020

By this Letter, we express our intention to support the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

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Stamp of the organisation



Signature

EXECUTIVE SUMMARY OF THE PROPOSAL

Our project proposal, led by Capgemini, aims to deploy the entire panel of activities, as listed in the Call : our suggested technological activities refer to innovative digital services and operations based on EU-satellite collected information, and our non-technological activities suggest citizens' engagement, cooperation and acceptance, as well as legal and socio-economical frameworks' establishment on various topics (regulation of polluting emissions at sea/port interface, green shipping, greenhouse gas emission/climate change).

The combination of innovative, TRL-high and easily replicable operational services can ensure effective, viable and sustainable solutions for the European ports of the future.

Our proposal gathers representatives from 8 EU Member states, including the industry (Capgemini, Altran Technologies, Thales Alenia Space), a strategic consulting with strong expertise in port operations and energy strategic roadmaps and digital transformation (Capgemini INVENT), the academia (University of Genova, Reims University, Klaipeda University), research centres active in air quality and GHG monitoring and simulation (Barcelona SuperComputing Center, Center for Research and Technology Hellas, Cyprus Institute), legal experts for the maritime environment (DNV GL, Hugo-Grotius GmbH), communication experts with particular focus on citizen communities' engagement (Threeoclock) as well as a substantial number of SMEs with expertise in space based information (CREOTECH, GEOSYSTEM HELLAS), in mobility (FACTUAL, ON AIR), in port operations and related strategies (SINAY, DNV GL, FINE BUBBLE TECHNOLOGY, SIARQ), and of course the four pilot ports from Poland, Lithuania, Italy and France.



Direction de l'Innovation, des Applications
et de la science
Sous-direction « Compétitivité et Développement »

Attention to : Marc Ferrer
Head of Space and ATM segment
CAP GEMINI
106 avenue du Général Eisenhower
31036 Toulouse Cedex 1

Affaire suivie par : Eric Brel
Tél : +33(0) 6 85 10 80 53
E-mail : eric.brel@cnes.fr

Paris, le 05/01/2021
N/Réf : DIA/CD 2021-000178

Subject : Letter of intent

By this Letter, we express our intention to support the proposal "**Greening Ports, Act for an Inclusive and Sustainable Future**" coordinated by CapGemini, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

In particular, we declare **our interest in becoming member of the Advisory Panel**, foreseen under the Replicability and Cooperation activities. We therefore commit to contribute in **the activities of the Advisory panel**, by attending its annual (virtual) meetings and providing feedback should it be necessary. We also agree on supporting the dissemination of the projects' activities and results through our "Connect by CNES" program (www.connectbycnes.fr, @ConnectbyCNES, LinkedIn ...), with a particular focus on promoting the innovative uptakes of the suggested solutions and technologies.

**Le Sous-Directeur Adjoint
DIA/CD**

Signature numérique de
Charbonnier Jean-Marc
Date : 2021.01.06
09:36:42 +01'00'

Jean-Marc Charbonnier

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Siret 775 665 912 000 82
Code APE 731 Z
N° identification :
TVA FR 49 775 665 912

cnes.fr

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Our project proposal, led by Capgemini, aims to deploy the entire panel of activities, as listed in the Call : our suggested technological activities refer to innovative digital services and operations based on EU-satellite collected information, and our non-technological activities suggest citizens' engagement, cooperation and acceptance, as well as legal and socio-economical frameworks' establishment on various topics (regulation of polluting emissions at sea/port interface, green shipping, greenhouse gas emission/climate change).

The combination of innovative, TRL-high and easily replicable operational services can ensure effective, viable and sustainable solutions for the European ports of the future.

Our proposal gathers representatives from 8 EU Member states, including the industry (Capgemini, Altran Technologies, Thales Alenia Space), a strategic consulting with strong expertise in port operations and energy strategic roadmaps and digital transformation (Capgemini INVENT), the academia (University of Genova, Reims University, Klaipeda University), research centres active in air quality and GHG monitoring and simulation (Barcelona SuperComputing Center, Center for Research and Technology Hellas, Cyprus Institute), legal experts for the maritime environment (DNV GL, Hugo-Grotius GmbH), communication experts with particular focus on citizen communities' engagement (Threeoclock) as well as a substantial number of SMEs with expertise in space based information (CREOTECH, GEOSYSTEM HELLAS), in mobility (FACTUAL, ON AIR), in port operations and related strategies (SINAY, DNV GL, FINE BUBBLE TECHNOLOGY, SIARQ), and of course the four pilot ports from Poland, Lithuania, Italy and France.

To:	Greening Ports, Act for an Inclusive and Sustainable Future
Copy:	si-Cluster BoD
Subject:	Letter of Intent

Athens, 04.12.2020

I, Jorge-A. Sanchez-P., Chairman of the Board of Directors of si-Cluster, the Hellenic Space Technologies and Application Cluster, wish to express the interest in supporting the project proposal **Greening Ports, Act for an Inclusive and Sustainable Future** that will be submitted to the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

The si-Cluster is a gold-labelled, industrially-led and user-driven innovation cluster in Greece, with a sizeable potential to compete worldwide in the challenging and fast-growing sector of space technologies and applications. Currently, the si-Cluster consists of more than 70 members -including both large businesses and SMEs- while it is expanding rapidly not only its industrial base but also its cooperation ties with all the innovation ecosystem actors, including academia, research institutes, European, regional and central governmental and other stakeholders involved in this demanding technological field. Aiming to develop Greece as a leading region for Space Technologies and Applications with a high international visibility, capable of developing and attracting high impact research, development and innovation and business activities, the si-Cluster brings together private and public actors in the field of space technologies and applications and provides an efficient framework around themes of common interest to reinforce the competitive advantage of its members.

We are aware that the project aims to deploy the entire panel of activities, as listed in the Call and gathers representatives from 8 EU Member states, including industry, a strategic consulting with strong expertise in port operations and energy strategic roadmaps and digital transformation, academia, research centres, legal experts for the maritime environment, communication experts with particular focus on citizen communities' engagement as well as a substantial number of SMEs with expertise in space based information, in mobility, in port operations and related strategies, and the pilot ports.

In particular, I declare my interest in becoming member of the Advisory Panel, foreseen under the Replicability and Cooperation activities, and follow the activities of the Advisory Panel, by attending its annual (virtual) meetings and providing feedback should it be necessary. I also agree on supporting the dissemination of the projects' activities and results to our network.

We hope for a positive evaluation of your proposal and look forward to collaborating with you.

Yours sincerely,



Jorge-A. Sanchez-P.
si-Cluster Chairman

A: Kifissias Ave.144, GR-15125
Maroussi, Athens, Greece

T: +30.210.63.00.770
F: +30.210.61.98.818

E: info@si-cluster.gr
W: www.si-cluster.gr





LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF INTENT

Organisation: UNIVERSITY OF PATRAS, DEPARTMENT OF ECE

Title, surname and name of representative: Professor Alexios Birbas

Function: Director Applied Electronics Laboratory

Address: Rion Campus

City code: 26500

City: Patras

Country: Greece

Phone number: +30 6944265118

Email address: birbas@ece.upatras.gr

Patras Greece, 05/January/2020

By this Letter, we express our intention to support the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

In particular, we declare **our interest in becoming member of the Advisory Panel**, foreseen under the Replicability and Cooperation activities. We therefore commit to **follow the activities of the Advisory panel**, by attending its annual (virtual) meetings and providing feedback should it be necessary. We also agree on supporting the dissemination of the projects' activities and results to our network, with a particular focus on promoting the innovative uptakes of the suggested solutions and technologies.

Stamp of the organisation



Signature

PROF. ALEXIOS BIRBAS



POLSKA AGENCJA ŻEGLUGI POWIETRZNEJ
POLISH AIR NAVIGATION SERVICES AGENCY

Warsaw, 22 January 2021

AXI.0708.02.010.2021

To Whom it May Concern,

By this Letter, we express our intention to support the proposal Greening Ports, Act for an Inclusive and Sustainable Future, in addressing the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal". The project scope includes use of Unmanned Aerial Vehicles in ports and is very well aligned with our current activities both performed locally in Poland and within the European U-Space ecosystem.

In particular, we declare our support through active participation in Advisory Panel, foreseen under the Replicability and Cooperation activities. We therefore commit to follow the activities of the Advisory panel, by attending its annual (virtual) meetings and providing feedback should it be necessary.

We also agree on supporting the dissemination of the projects' activities and results to our network, with a particular focus on promoting the innovative uptakes of the suggested solutions and technologies.

Sincerely yours,

p.o. Kierownika Działu Innowacji

Jarosław Niewiński

POLISH AIR NAVIGATION SERVICES AGENCY, Wieżowa 8, 02-147 Warszawa, POLAND
Telephone: (+48 22) 574 50 00, Fax: (+48 22) 574 50 09
NIP: 522-283-83-21, REGON : 140886771
www.pansa.pl



LC-GD-5-1-2020: “Green airports and ports as multimodal hubs for sustainable and smart mobility”

LETTER OF SUPPORT

Organisation: EIT Climate-KIC Hub Greece

Title, surname and name of representative: Prof. Phoebe Koundouri

Function: Director

Address: 3 Romanou Melodou Str.

City code: 151 25

City: Maroussi

Country: Greece

Phone number: 210 687 5300

Email address: pkoundouri@aueb.gr

Athens, 27/12/2020

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: “Green airports and ports as multimodal hubs for sustainable and smart mobility”, under the cross-cutting call “H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal”.

We support this proposal that has as ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**. The proposal is led by Capgemini with the support of a very **strong and competent Consortium** and it invests in a plethora of activities focusing on a **fast, reliable and sustainable transition** towards emissions-free ports of the future. This proposal is also paying attention to **citizens’ engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that the project will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby

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express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Signature



Prof. Dr. Phoebe Koundouri (BA, MPhil, MSc, PhD_Cambridge)
Professor School of Economics, Director [ReSEES Research Laboratory](#), ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS
President-Elect, [European Association of Environmental and Resource Economists](#)
Director, [EIT Climate-KIC Hub Greece @ ATHENA RC](#)
Co-Chair, [UN SDSN Greece](#)
Chair, Scientific Advisory Board, [ICRE8 International Research Center](#)
Chair, Scientific Advisory Board, [European Forest Institute](#)

EXECUTIVE SUMMARY OF THE PROPOSAL

Our project proposal, led by Capgemini, aims to deploy the entire panel of activities, as listed in the Call : our suggested technological activities refer to innovative digital services and operations based on EU-satellite collected information, and our non-technological activities suggest citizens' engagement, cooperation and acceptance, as well as legal and socio-economical frameworks' establishment on various topics (regulation of polluting emissions at sea/port interface, green shipping, greenhouse gas emission/climate change).

The combination of innovative, TRL-high and easily replicable operational services can ensure effective, viable and sustainable solutions for the European ports of the future.

Our proposal gathers representatives from 8 EU Member states, including the industry (Capgemini, Altran Technologies, Thales Alenia Space), a strategic consulting with strong expertise in port operations and energy strategic roadmaps and digital transformation (Capgemini INVENT), the academia (University of Genova, Reims University, Klaipeda University), research centres active in air quality and GHG monitoring and simulation (Barcelona SuperComputing Center, Center for Research and Technology Hellas, Cyprus Institute), legal experts for the maritime environment (DNV GL, Hugo-Grotius GmbH), communication experts with particular focus on citizen communities' engagement (Threeoclock) as well as a substantial number of SMEs with expertise in space based information (CREOTECH, GEOSYSTEM HELLAS), in mobility (FACTUAL, ON AIR), in port operations and related strategies (SINAY, DNV GL, FINE BUBBLE TECHNOLOGY, SIARQ), and of course the four pilot ports from Poland, Lithuania, Italy and France.

****CONFIDENTIAL****



PROTOCOLLO AdSP MAS.U.0000789.18-01-2021

NORTH ADRIATIC SEA
PORT AUTHORITY

Autorità di sistema portuale
del Mare Adriatico settentrionale
2021 - III 21
N. Prot 789 Data 18 01 2021

Kind attention to
Carine Saüt,
Science & Space Applications
CAPGEMINI "FRANCE"
Email : carine.saut@capgemini.com
106 Avenue du Général Eisenhower
BP 53655 - 31036 Toulouse



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: NORTH ADRIATIC SEA PORT AUTHORITY
Title, surname and name of representative: CINZIA ZINCONI
Function: SPECIAL COMMISSIONER
Address: ZONA PORTUALE S. MARTA, FABBRICATO 13
City code: 30123 City: VENICE Country: ITALY
Phone number: +390415334239
Email address: adspmas.presidenza@port.venice.it

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

We support this proposal, with the ultimate objective to deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard, led by Capgemini with the support of a very strong and competent Consortium and invests in a plethora of activities focusing on a fast, reliable and sustainable transition.



NORTH ADRIATIC SEA
PORT AUTHORITY

This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature

Venice, 18/01/2021

EXECUTIVE SUMMARY OF THE PROPOSAL

Our project proposal aims to deploy the entire panel of activities, as listed in the Call : our suggested technological activities refer to innovative digital services and operations based on EU-satellite collected information, and our non-technological activities suggest citizens' engagement, cooperation and acceptance, as well as legal and socio-economical frameworks' establishment on various topics (regulation of polluting emissions at sea/port interface, green shipping, greenhouse gas emission/climate change).

The combination of innovative, TRL-high and easily replicable operational services can ensure effective, viable and sustainable solutions for the European ports of the future.

Our proposal gathers representatives of 8 EU Member states from the industry (Capgemini, Altran Technologies, Thales Alenia Space), a strategic consulting with strong expertise in port operations and energy strategic roadmaps and digital transformation (Capgemini INVENT), from the academia (University of Genova, Reims University, Klaipeda University), research centres active in air quality and GHG monitoring and simulation (Barcelona SuperComputing Center, Center for Research and Technology Hellas, Cyprus Institute), legal experts for the maritime environment (DNV GL, Hugo-Grotius GmbH), communication experts with particular focus on citizen communities' engagement (Threeoclock) as well as a substantial number of SMEs with expertise in space based information (CREOTECH, GEOSYSTEM HELLAS,) in mobility (FACTUAL, ON AIR), in port operations and related strategy (SINAY, DNV GL, FINE BUBBLE TECHNOLOGY, SIARQ), and of course the three pilot ports from Poland, Lithuania, and France.



Hellenic Republic
Ministry of Development and Investments
General Secretariat for Research and Technology

Athena-Research and Innovation Center in Information,
Communication and Knowledge Technologies

Athens, 05.01.2021

To: Greening Ports Act for an Inclusive and Sustainable Future Proposal Partners

Subject: Letter of Support


I, Prof. Vassilios Makios, General Director of Corallia Unit of Athena Research Center, wish to express the interest in supporting the project proposal **Greening Ports Act for an Inclusive and Sustainable Future**, that will be submitted to the call "LC-GD-5-1-2020: Green airports and ports as multimodal hubs for sustainable and smart mobility" under the Horizon 2020 programme of the European Commission.

Corallia is an incubator, youth entrepreneurship accelerator, and multi-Cluster facilitator established in 2005 at the Athena Research and Innovation Centre and has played a key role in the development of the Greek startup ecosystem. Our main achievements to this date are: the foundation of 3 hi-tech Clusters with more than 175 members consisting of the most innovative enterprises, university labs and research institutes in their respective sectors – the Gold labelled **si-Cluster** (space technologies and applications cluster) aiming to develop Greece as a leading region for space technologies and applications and **gi-Cluster** (gaming and creative technologies & applications cluster) which displays state-of-the-art technology edge coupled with an extrovert, global-reaching entrepreneurial spirit; the Silver labelled **mi-Cluster** (nano/microelectronics-based systems and applications cluster) the first innovation cluster in Greece; the systematic organisation of targeted training and inspirational events, the design and implementation of pioneering entrepreneurship acceleration and incubation programmes, the organization of innovation contests such as hackathons, appathons and game jams, the establishment and operation of innovation hubs in Attica and Western Greece regions, the organization of business roadshows and trade fairs in Europe, America and Asia, etc. As of 2018, Corallia is also a registered by the EC, fully operational, Digital Innovation Hub, thus belonging to a network of more than 150 organisations, acting as competence centres and one-stop-shops where companies can get access to the latest knowledge, including technology-testing, financing advice and market intelligence in order to help them become more competitive by using digital innovations.

We are aware that the Greening Ports project has as ultimate objective to deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard. It is led by Capgemini with the support of a very strong and competent Consortium and it invests in a plethora of activities focusing on a fast, reliable and sustainable transition towards emissions-free ports of the future. The project is also paying attention to citizens' engagement and acceptance, an approach highly appreciated. In case of its final selection, we believe that it will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments.

We hope for a positive evaluation of your proposal and look forward to collaborating with you.

Yours sincerely,


Prof. Vassilios Makios
General Director

Kifissias Ave. 44, Monumental Plaza-Building C, GR-15125 Maroussi | T: +30.210.63.00.770 | E: info@corallia.org | W: www.corallia.org





Patras, 23/ 12 / 2020

Ref. No: 12425

Subject: GREENING PORTS, ACT FOR AN INCLUSIVE AND SUSTAINABLE FUTURE – LETTER OF SUPPORT

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020: Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

We believe that this proposal, with the ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use monitoring dashboard**, is led by a very **strong and competent Consortium** and invests in a plethora of activities focusing on a fast, **reliable and sustainable transition**. This proposal is also paying particular attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will actually lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation
PATRAS PORT AUTHORITY
SOCIETE ANONYME (OLPA S.A.)



Signature
Managing Director

Panagiotis Tsonis

South Port of Patras, Port Authority Administration Building, Zip Code: 26333, Patras-Greece
www.patrasport.gr, email: info@patrasport.gr, Tel.: +302610365113, Fax.: +302610365110



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: Environmental Protection Agency (EPA)

Title, surname and name of representative: Rimgaudas Špokas

Function: Director

Address: Juozapavicius str. 9

City code: LT-09311

City: Vilnius

Country: Lithuania

Phone number: +370 62071791

Email address: rimgaudas.spokas@aaa.am.lt

Vilnius, 22/12/2020

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020: Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

We support this proposal, with the ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**, led by Capgemini with the support of a very **strong and competent Consortium** and invests in a plethora of activities focusing on a fast, **reliable and sustainable transition**. This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature



LIETUVOS RESPUBLIKOS
SUSISIEKIMO MINISTERIJA

LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: The Ministry of Transport and Communications of the Republic of Lithuania		
Title, surname and name of representative: Saulius Kerza		
Function: Director of Budget and Investment Department, acting as Chancellor of the Ministry		
Address: Gedimino Av. 17		
City code:	LT-01505	City: VILNIUS Country: LITHUANIA
Phone number:	+370 5 239 3924 Email address: saulius.kerza@sumin.lt	

Vilnius, 22/12/2020

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

We support this proposal, with the ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**, led by Capgemini with the support of a very **strong and competent Consortium** and invests in a plethora of activities focusing on a fast, **reliable and sustainable transition**. This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature



Ministry of Transport
of the Russian Federation

FEDERAL STATE
UNITARY ENTERPRISE
«ROSMORPORT»
NORTH-WESTERN BRANCH
KALININGRAD AUTHORITY

Box 122, RF-236950, Kaliningrad, Russia
tel. (4012) 36-21-00, fax. 36-21-02
e-mail: mail@kld.rosморport.ru

Our ref. № *94080 - 14/6589 am 28.12.2020*

GREENING PORTS, ACT FOR AN INCLUSIVE AND SUSTAINABLE FUTURE LETTER OF SUPPORT

Organisation: Federal State Unitary Enterprise "Rosmorport" North-Western basin branch
Kaliningrad Authority
Title, surname and name of representative: Mr. Moshkov Andrey
Function: Kaliningrad Authority Director
Address: Petra Velikogo emb., 7
City code: RF-236950 **City:** Kaliningrad **Country:** Russia
Phone number: +7 4012 362100 **Email address:** nmamenko@kld.rosморport.ru

Kaliningrad, 25/12/2020

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

We believe that this proposal, with the ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use monitoring dashboard**, is led by a very strong and competent Consortium and invests in a plethora of activities focusing on a fast, reliable and sustainable transition. This proposal is also paying particular attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that this proposal will actually lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature



LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: Union des Ports de France

Title, surname and name of representative: Jean-Pierre CHALUS

Function: President

Address: 8 Place du Général Catroux

City code: 75017

City: PARIS

Country: FRANCE

Phone number: +33 1 42 27 52 62

Email address: portsdefrance@port.fr

Paris, 22/01/2021

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

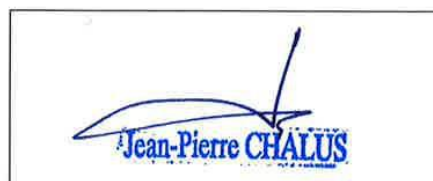
We support this proposal that has as ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**. The proposal is led by Capgemini with the support of a very **strong and competent Consortium** and it invests in a plethora of activities focusing on a **fast, reliable and sustainable transition** towards emissions-free ports of the future. This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that the project will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature





LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility"

LETTER OF SUPPORT

Organisation: Ocean University of China

Title, surname and name of representative: Honorary dean of College of Marine Geosciences, Prof. Li Guangxue

Function: Science and technology research

Address: 238 Songling Road

City code: 0532 **City:** Qingdao **Country:** China

Phone number: 66782542 **Email address:** gxli1962@163.com

Location, 31/12/2020

By this Letter, we express our profound support to the proposal **Greening Ports, Act for an Inclusive and Sustainable Future**, to address the topic LC-GD-5-1-2020: "Green airports and ports as multimodal hubs for sustainable and smart mobility", under the cross-cutting call "H2020-LC-GD-2020 : Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal".

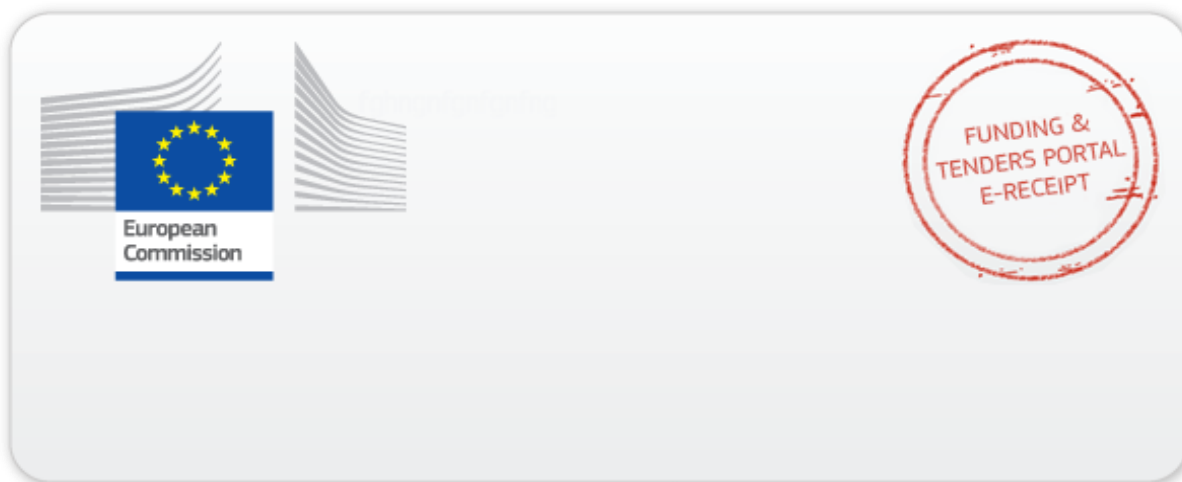
We support this proposal that has as ultimate objective to **deliver high TRL innovative solutions for the future Green Port in a mature and well-integrated Master Plan accompanied by a smart ready-to-use dashboard**. The proposal is led by Capgemini with the support of a very **strong and competent Consortium** and it invests in a plethora of activities focusing on a **fast, reliable and sustainable transition** towards emissions-free ports of the future. This proposal is also paying attention to **citizens' engagement and acceptance**, an approach that we appreciate a lot.

In case of the final selection of this proposal, we estimate that the project will lay the groundwork to mitigating climate change in the maritime transport sector, and all related environments. We hereby express our interest in closely following the advancement of the proposed solutions and technologies, and consequently, their integration in sustainable value chains in the sectors involved.

Stamp of the organisation



Signature



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