

# NET4mPLASTIC PROJECT

WP5 – Act. 5.4 Pilot implementation,  
business simulation and assessment

## D 5.4.5

Cost Benefits Analysis – CBA of the platform

June, 2022 - Version 1.0

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## Acronyms / Abbreviations

ACRONYM	DEFINITION
EWS	Early Warning System
MP	Microplastic
OBU	On board Unit
PP	Project Plan
PT	Project team
TC	Technical task coordinator
TGS-ML	Technical Subgroup on Marine litter, European Union expert group On marine litter
TM	Task Manager
UML	Unified Modelling Language
WP	Workpackage

# 1 Introduction

## 1.1 Background of the project

The main goal of the NET4mPLASTIC project is to achieve an efficient monitoring system for plastic and MP distribution along the Croatian and Italian coastal and marine areas in order to improve the environmental coastal and marine sea quality conditions.

According to doc R1, the WP5 deals with the design implementation of the EWS - Early Warning System including:

- a control centre, based on system hardware and network (Prosoft), and a EWS application (Hydra Solutions) integrated with the transport model and external systems (such as the oceanographic model - (Marche Region);
- Integrated Marine Drone, for collection of MP - microplastic, and geolocalized water indicators on the route (Hydra Solutions);
- Integrated Marine OBU, a unit to be installed on board of ships for improved MP collection with geolocalized water indicators on the route (Hydra Solutions).

The design shall be carried out with the modern system engineering approach based on UML - Unified Modelling Language (Hydra Solutions). UNITS and RERA SD will provide data for the first set up of the platform related to MP. Based on this WP, the transport model will be developed in WP4. The development of the EWS platform integrated with the transport model will be done in WP5.

The activities planned for WP5 are the following:

- development of the EWS - Early Warning System data center platform and integration with the transport model (WP4)
- development of the UAV/marine drone for real-time data acquisition
- testing and calibration
- business simulation for testing the solution with real users –
- final assessment of the solution, including a CBA—cost benefit analysis and the preparation of the business plan.

The main expected output will be:

- EWS integrated platform, implemented and tested
- Training for the required personnel and users - Assessment of the platform.

The required main software modules of the EWS platform will be:

- MP Transport model, providing data with distribution and concentration,
- MP WebGIS platform, for: a) Display MP data (historical, actual forecast, 24-72h forecast) b) Early warning provision, based on the transport model c) Data entry, recording & replay
- MP DB, the DB for collecting data
- A mobile APP, for starting/closing the field activities and for data reporting
- Firmware for marine remote units - Integration with external system, for meteo/other data

The coordinator will be Hydra Solutions. The EWS SW platform will be developed by Hydra Solutions, with the support of Marche Region for the transport model, and Prosoft for localization, the ICT

implementation, the integrated testing, training and support for maintenance activities. UNITS will coordinate the assessment of the platform. The other partners involved will give contribution for data entry, as target user, and for preparation of the required documentation. The user target group will be based on the main project partners, institution, regions and councils. They will be involved in the design stage for collecting the main needs, for testing and user training of the solution. The target group will be required to use the system during the business simulation, and provide feedback.

The expected reports within WP5 are the following:

- D 5.1.4 –Hardware and Network Integration Report (Report): this deliverable will provide a report with details on integration of the network and other hardware required for the system;
- D 5.1.5 –Test procedures and reporting (Report): this deliverable will provide the procedures for testing the data centre and the integrated solution in the test bed environment, and the reporting of the tests done to assure the quality of the solution provided;
- D 5.1.6 –Hardware & Network Maintenance Manual (Document); this deliverable will provide the manual for the maintenance of the hardware and the network of the system;
- D 5.1.7 –Software User and Maintenance Manual (Document); this deliverable will provide the manual for the maintenance of the software and the User manual for the operators
- D 5.2.4 – Marine OBU / Drone Test Procedure and Report (Document): this deliverable will provide the procedures for testing the drones and the OBU, and the reporting of the tests done to assure the quality of the solution provided;
- D 5.2.5 –Marine OBU / Drone Maintenance Manual (Document); this deliverable will provide the manual for the maintenance of the Drone and OBU;
- D 5.2.6 – Marine OBU / Drone User Manual (Document); this deliverable will provide the User manual for the operators;
- D 5.3.1 – Data Centre Hardware and Network Facility implemented (Hardware, report), in this deliverable is relevant to the implementation of the data centre for the integrated solution, hardware and the network facility, and the preparation of the AS BUILT document describing the data centre facility;
- D 5.3.2 – Remote Units and Data Centre Communication Test Procedure and Report (Document); this deliverable will provide the procedures for testing the communication integration between remote units and the data centre, and the relevant reporting of the tests done to assure the quality of the solution provided;
- D 5.3.3 – Data Centre Test Procedure and Report (Document): this deliverable will provide the procedures for testing the features of the solution provide in the data centre, and the relevant reporting of the tests done to assure the quality of the solution provided, that will be done in cooperation with the main stakeholders;
- D 5.3.4 – Integrated System Final Test Procedure and Report (Document): this deliverable will provide the procedures for the integrated test cases testing the integrated solution, and the relevant reporting of the tests done to assure the quality of the solution provided, that will be done in cooperation with the main stakeholders.
- D 5.4.1 – Training documentation (document): this deliverable is relevant to the implementation of the required documentation for performing training to the personnel involved in the business simulation (as defined in the WP3.3 and the design of the solution);

- D 5.4.2 – Training assessment (report): this deliverable is relevant to the implementation of the training to be done for the personnel involved in the business simulation, with a reporting on evaluation of the training;
- D 5.4.3 – Training assessment (report): this deliverable is relevant to the final description of the Integrated Marine Remote unit (Drone/OBU);
- D 5.4.4 – Questionnaire for platform assessment (report) this deliverable is relevant to the preparation of a questionnaire for evaluation of the platform from the user point of view involved in the business simulation;
- D 5.4.5 – Cost Benefits Analysis – CBA of the platform (Document); this deliverable will provide a final document with lessons learnt during the real use of the platform, an evaluation of the benefits of the platform, and costs for full exploitation of the solution, including the future recommendations on potential improvement, and including a business plan for a full implementation of the platform.

## 1.2 Purpose of the report

This document describe the **deliverable D.5.4.5 – Cost benefit Analysis – CBA of the EWS platform**, following the implementation of the EWS and relevant testing.

This deliverable is within the activity 5.4 of the Net4mPlastic project - Pilot implementation, business simulation and assessment, that is focused on the implementation of the required documentation for performing training to the personnel involved in the business simulation.

The purpose of this document is summarized as follows:

- an evaluation of the benefits of the platform and the lessons learnt during the real use of the platform,
- recommendations on future improvement,
- the existing costs for data collection and processing
- the costs for full exploitation of the EWS solution
- financial plan introducing the EWS platform.
- conclusions.

The main tasks planned in the activity 5.4 of the Net4mPlastic project are the following:

- implementation of the solution in the pilot sites. A user training will be performed for each area. A total n. of 2 Drones and 2 OBU has been planned for the field activities (UNITS)
- start up a period of min 4 months of BS
- Business Simulation, where real users will be involved in the process using the system, in cooperation with the main stakeholders, performing the required field activities and reacting in case Early Warning will be provided by the platform (UNITS)
- an assessment will be performed to provide a CBA – Cost / Benefits Analysis of the platform, providing future recommendation on potential improvement, and including a business plan for a full implementation of the platform (UNITS).



The coordinator of this activity will be UNITS, in cooperation with UNIST-FGAG, UNIFE, RERA, HYDRA, PROSOFT, MARCHE, and other institutional users that will be selected.

### 1.3 Reference documentation

No	Title	Rif/Report N.	Published by
[R1]	<b>APPLICATION FORM - NET4mPLASTIC Project - New Technologies for macro and Microplastic Detection and Analysis in the Adriatic Basin</b>  2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - NET4mPLASTIC Priority Axis:Environment and cultural heritage	Application ID: 10046722, dated 30/06/2017	Lead applicant: UNIVERSITY OF FERRARA
[R2]	D 5.1.4 –Hardware and Network Integration Report		ACT5.1 – Net4Mplastic
[R3]	D 5.1.5 –Test procedures and reporting (Report)		ACT5.1 – Net4Mplastic
[R4]	D 5.1.6 –Hardware & Network Maintenance Manual		ACT5.1 – Net4Mplastic
[R5]	D 5.1.7 –Software User and Maintenance Manual		ACT5.1 – Net4Mplastic
[R6]	D 5.2.4 – Marine OBU / Drone Test Procedure and Report		ACT5.2 – Net4Mplastic
[R7]	D 5.2.5 –Marine OBU / Drone Maintenance Manual		ACT5.2 – Net4Mplastic
[R8]	D 5.2.6 – Marine OBU / Drone User Manual		ACT5.2 – Net4Mplastic
[R9]	D 3.3.1 – EWS Requirements definitions based on the stakeholders and users’ needs, through questionnaires and specific meeting		ACT3.3 – Net4Mplastic
[R10]	D 3.3.2 – EWS Hardware Architecture and network design (central Data Centre Hardware Architecture Client/Server, Data network architecture and related communication segments)		ACT3.3 – Net4Mplastic

[R11]	D 3.3.3 – EWS Software Architecture design (data modelling software, GIS applications, early warning detection software, etc.), the Relational Database to manage all collected data with related meta data, the communication Front-End for web remote access, the Data Centre Software Interfaces for users		ACT3.3 – Net4Mplastic
[R12]	D 3.3.4 – EWS Hardware and other software Components Specifications design (Integrated Marine Drone and Marine OBU, with details of required components (hardware and firmware), firmware and other software components (mobile apps for managing the drones and for remote mobile activities).		ACT3.3 – Net4Mplastic
[R13]	D 3.3.5 - Report and database provision with all the collected data		ACT3.3 – Net4Mplastic
[R14]	D 5.3.1 - Data Centre Hardware and Network Facility implemented (Hardware, report)		ACT5.3 – Net4Mplastic
[R15]	D 5.3.2 - Remote Units and Data Centre Communication Test Procedure and Report (Document)		ACT5.3 – Net4Mplastic
[R16]	D 5.3.3 - Data Centre Test Procedure and Report (Document)		ACT5.3 – Net4Mplastic
[R17]	D 5.3.4 - Integrated System Final Test Procedure and Report (Document)		ACT5.3 – Net4Mplastic
[R18]	D 5.4.1 – Training documentation		ACT5.4 – Net4Mplastic
[R19]	D 5.4.2 – Training assessment		ACT5.4 – Net4Mplastic
[R20]	D 5.4.3 – Integrated Marine Remote unit (Drone/OBU)		ACT5.4 – Net4Mplastic
[R21]	D 5.4.4 – Questionnaire for platform assessment		ACT5.4 – Net4Mplastic

## 2 Main benefits and lesson learnt introduced by the EWS platform

### 2.1 Participant list

We had a good participation within the user group, represented by most of the project partners, some representative of external stakeholders. We got 17 questionnaires for assessment.

### 2.2 Key index for assessment

The main key indexes considered for assessment are the following:

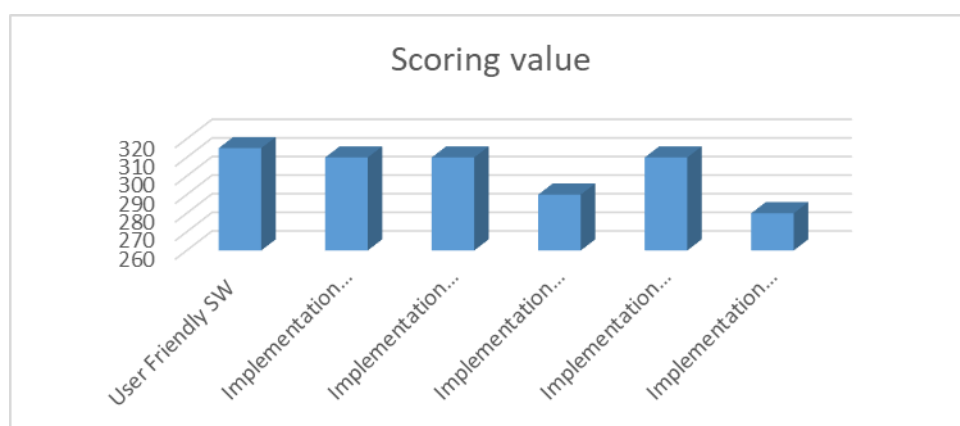
- User Friendly SW
- Implementation of mission data visualization
- Implementation of model data visualization
- Implementation of Macro Plastic Visualization
- Implementation of Data Exporting
- Implementation of Data Entry

### 2.3 Analysis

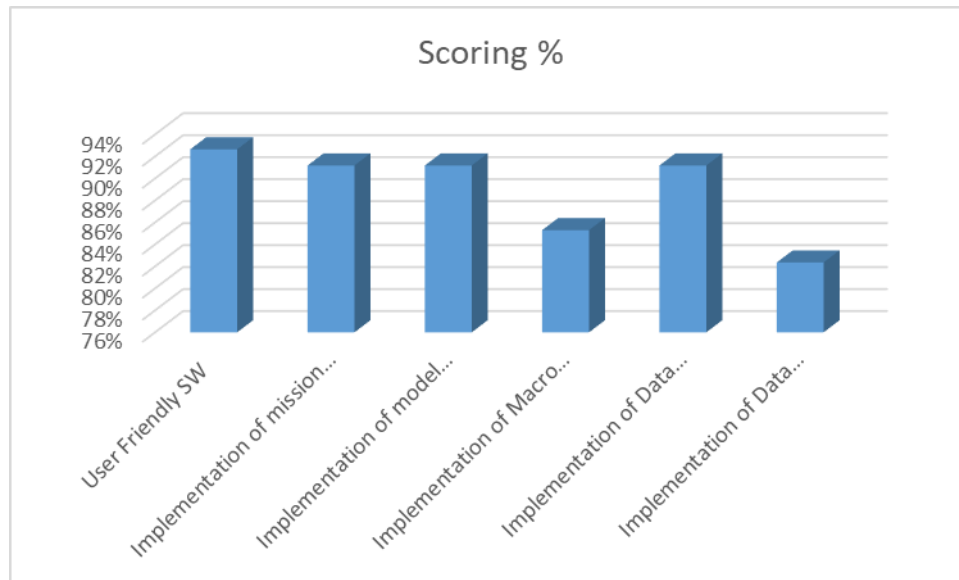
Here is a table summarizing the overall value assigned by the participants to the indicators.

indicators	insuff	suffic	good	excellent	total
User Friendly SW	0	0	5	12	17
Implementation of mission data visualization	0	0	6	11	17
Implementation of model data visualization	0	0	6	11	17
Implementation of Macro Plastic Visualization	0	0	10	7	17
Implementation of Data Exporting	0	0	6	11	17
Implementation of Data Entry	0	1	9	7	17

The following chart provide the scoring assigned to the indicator, where 100 is the max value, considering a weight of 0 if insufficient, 5 if sufficient, 15 if good, and 20 if excellent.



Here is the same scoring in %



According to the scoring calculated:

- The overall scoring of the solution is about 90%
- About the main functionalities
  - o User friendly SW is quoted as the best
  - o Implementation of mission data visualization, model data visualization, and data exporting are well scored
  - o Macro Plastic Visualization need improvements
  - o The Implementation of Data Entry has the worst scoring, and is asking to future improvements

## 2.4 Suggestions of future improvements

Based on the data collected using the questionnaires and the meeting with stakeholders, the main suggestions raised by the stakeholders for some improvements and future developments are the following:

- To expand the data obtaining to other zones in Adriatic (apart from 4 zones from Net4mPlastic project). This includes of course the engagement in filling the data regularly and unifying the data entry/templates among those who are providing the data (in particularly scientific institutions). In this way, the process of filling the data could approach more quickly to the -as much as possible- automatic one. This was also subject of discussion during the presentation of EWS platform.
- On DRONE – OBU DATA: Mission names mismatch: Please replace “Kvarner-Vinodol channel” with “Kvarner- Klimno” and vice-versa.
- On DATA MODEL: Translate Legend on the map from IT to EN
- On SEA SENTINEL: Zoom out the initial map view
- To trim digits only considering the correct number of meaningful digits

- To provide:
  - Info about data uncertainty
  - Labels on graph
  - Labels on color scales
- To specify better the legend about percentage of micro plastic presence in different points relative to not absolute values
- Format visualization on EWS platform, for instance x,xx %, and not x,xxxxxx (just for the EWS platform, not for the data to be downloaded).

## 3 Business plan

### 3.1 Introduction

This chapter is relevant to the business plan, detailing the existing costs for data collection and processing, the cost for implementation and maintenance of the EWS solution, the overall financial plan, considering the operational costs of data collection and processing using the drones, to understand the sustainability.

### 3.2 Existing costs for data collection and processing

The expected cost per typical coastal transept of 1 NM is about 12.400 euro. This is including the data collection cost, including 1 boat with a skipper and one expert for 4 hours, and the cost of processing.

Task	Cost of Boat (50CV engine) + Skipper + 1 Person for 4 hours	CO2 Produced [kg]	Time to get results [day]	Cost of post processing	Totale cost
Typical Coastal Transept of 1 NM	2.400,00 €	17,5	30	10.000,00 €	12.400,00 €

The total number of existing surveys is about 300 per year, for both countries, Italy and Croatia, considering a frequency of one transept survey per month, and selection of 10 transept in Croatia and 15 in Italy.

To allow a more intensive monitoring of microplastic, if the survey frequency is increased to one per week, the total number of surveys will be 1200 per year.

Task	n. transept per year italy	n. transept per year croatia	frequency per year	Totale n. of surveys Italy	Totale n. of surveys Croatia	Totale n. of surveys	note
Typical Coastal Transept of 1 NM	15	10	12	180	120	300	situation
Typical Coastal Transept of 1 NM	15	10	48	720	480	1200	enhanced

Based on cost per transept survey, and the number of the transept per year, the existing total cost for data collection and analysis amounts to about 3.720.000 euro per year. For a more intensive monitoring, the cost increase to about 14.880.000 euro per year.

Considering a period of 10 years, the overall existing costs expected is respectively about 37.200.000 euro and 140.880.000 euro

Task	Cost per one transept	total n. of surveys	Total OPEX cost	Total OPEX cost in 10 Y
Existing costs	12.400,00 €	300	3.720.000,00 €	37.200.000,00 €
Existing costs	12.400,00 €	1200	14.880.000,00 €	148.800.000,00 €

### 3.3 Analysis of EWS implementation costs

The solution provided to be market ready ask for improvement, and new functions to be added considering the required new functions.

#### 3.3.1 BoQ

The overall system configuration includes:

- Implementation of EWS solution, ready to market, available on cloud
- Supply of 25 drones
- Supply of 25 mobile computer
- Operational assistance for 100 days
- Training and documentation
- Warranty and maintenance services for 10 years

Equipments	Total	note
<b>Control Centre - hardware and software application</b>		
<b>Software</b>		
EWS update and licence	1	on cloud
integration with meteo / environmental system	1	via API
API for other systems	1	via API
		on cloud
<b>Hardware</b>		
portable mobile x maintenance /asset mng/data collection	25	
Cloud service setup	1	
<b>Drones</b>		
marine drones	25	
<b>Engineering</b>		
Management	1	
Design (including civil design, doc to support for authorization, system design)	1	
Configuration	1	
system integration tests	1	
test, FAT, SAT, commissioning, roll out	1	
Training, documentation	1	
transport	1	
Risk, insurance, and contingencies	1	
<b>After sales</b>		
Operational assistance	100	100 days
Warranty/ maintenance services	10	years
Cloud services	10	years

### 3.3.2 Implementation time

The overall EWS system is expected to be fully operational within 18 months, following the design, implementation of software and hardware components.

### 3.3.3 CAPEX costs

The overall EWS system is expected to be fully operational within 18 months, following the design, implementation of software and hardware components.

The overall implementation CAPEX costs amount to about 1.681.500 euro, including the software and hardware components, and all the engineering services.

Equipments	Total	Price unitary	Total Price	
<b>Control Centre - hardware and software application</b>				
<b>Software</b>				
EWS update and licence	1	300.000,00 €	300.000,00 €	
integration with meteo / environmental system	1	50.000,00 €	50.000,00 €	
API for other systems	1	50.000,00 €	50.000,00 €	400.000,00 €
<b>Hardware</b>				
portable mobile x maintenance /asset mng/data collection	25	600,00 €	15.000,00 €	
Cloud service setup	1	10.000,00 €	10.000,00 €	25.000,00 €
<b>Drones</b>				
marine drones	25	40.000,00 €	1.000.000,00 €	1.000.000,00 €
<b>Engineering</b>				
Management	1	71.250,00 €	71.250,00 €	
Design (including civil design, doc to support for authorization, system design)	1	28.500,00 €	28.500,00 €	
Configuration	1	28.500,00 €	28.500,00 €	
system integration tests	1	14.250,00 €	14.250,00 €	
test, FAT, SAT, commissioning, roll out	1	28.500,00 €	28.500,00 €	
Training, documentation	1	28.500,00 €	28.500,00 €	
transport	1	14.250,00 €	14.250,00 €	
Risk, insurance, and contingencies	1	42.750,00 €	42.750,00 €	256.500,00 €
				1.681.500,00 €

### 3.3.4 OPEX costs

The overall operational costs amount to about 244.520 euro, including the operational assistance, the warranty and maintenance services, to maintain the system, and the cloud services.

Equipments	Total	Price unitary	Total Price	
<b>After sales</b>				
Operational assistance for 100 days	100	800,00 €	80.000,00 €	
Warranty/ maintenance services per year	1	134.520,00 €	134.520,00 €	
Cloud services for year	1	30.000,00 €	30.000,00 €	
				244.520,00 €

### 3.3.5 EWS overall costs

Cosidering a life cycle of 10 years, and an inflation rate of 3% per year, the overall total cost for implementation and operational maintenance of the service is expected to be about 3.647.000 euro.

The table below provides more details.



Component	implementation time	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	total
<b>CAPEX</b>												
software	400.000,00 €											400.000,00 €
hardware	1.025.000,00 €											1.025.000,00 €
engineering	256.500,00 €											256.500,00 €
<b>OPEX</b>												
Operational assistance	80.000,00 €											80.000,00 €
Warranty/ maintenance services per year	134.520,00 €	138.555,60 €	142.712,27 €	146.993,64 €	151.403,45 €	155.945,55 €	160.623,91 €	165.442,63 €	170.405,91 €	175.518,09 €		1.542.121,04 €
Cloud services for year	30.000,00 €	30.900,00 €	31.827,00 €	32.781,81 €	33.765,26 €	34.778,22 €	35.821,57 €	36.896,22 €	38.003,10 €	39.143,20 €		343.916,38 €
<b>Total costs with EWS</b>	<b>1.681.500,00 €</b>	<b>244.520,00 €</b>	<b>169.455,60 €</b>	<b>174.539,27 €</b>	<b>179.775,45 €</b>	<b>185.168,71 €</b>	<b>190.723,77 €</b>	<b>196.445,48 €</b>	<b>202.338,85 €</b>	<b>208.409,01 €</b>	<b>214.661,28 €</b>	<b>3.647.537,42 €</b>
Incremental costs	1.681.500,00 €	1.926.020,00 €	2.095.475,60 €	2.270.014,87 €	2.449.790,31 €	2.634.959,02 €	2.825.682,79 €	3.022.128,28 €	3.224.467,13 €	3.432.876,14 €	3.647.537,42 €	

### 3.4 EWS costs for data collection and processing

The expected cost per typical coastal transect of 1 NM using the EWS is about 2.000 euro. This is including the data collection cost, including the staff to manage the drone and the cost of processing.

Task	cost of drone service	CO2 Produced [kg]	Time to get results [day]	Cost of post processing	Totale cost
Typical Coastal Transect of 1 NM	500,00 €	0,125	1	1.500,00 €	2.000,00 €

The total number of existing surveys is about 300 per year, for both countries, Italy and Croatia, considering a frequency of one transect survey per month, and selection of 10 transect in Croatia and 15 in Italy.

To allow a more intensive monitoring of microplastic, if the survey frequency is increased to one per week, the total number of surveys will be 1200 euro per year.

Based on cost per transect survey, and the number of the transect per year, the existing total cost for data collection and analysis amounts to about 600.000 euro per year. For a more intensive monitoring, the cost increase to about 2.400.000 euro per year.

Considering a period of 10 years, the overall operational costs for data collection and processing using drones expected is respectively about 6.000.000 euro and 2.400.000 euro.

Task	Cost per one transept	total n. of surveys	Total OPEX cost	Total OPEX cost in 10 Y
Costs using drones	2.000,00 €	300	600.000,00 €	6.000.000,00 €
Costs using drones	2.000,00 €	1200	2.400.000,00 €	24.000.000,00 €

### 3.5 Total costs for data collection and processing using the EWS solution

Considering a period of 10 years, including the cost of the EWS implementation and the overall costs data collection and processing using drones of the EWS solution, is about 10.525.000 euro, according the the table below. The operational costs are considering an inflation rate of 3%.

Component	implementation time	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	total
<b>CAPEX</b>												
software	400.000,00 €											400.000,00 €
hardware	1.025.000,00 €											1.025.000,00 €
engineering	256.500,00 €											256.500,00 €
<b>OPEX</b>												
Operational assistance	80.000,00 €											80.000,00 €
Warranty/ maintenance services per year	134.520,00 €	138.555,60 €	142.712,27 €	146.993,64 €	151.403,45 €	155.945,55 €	160.623,91 €	165.442,63 €	170.405,91 €	175.518,09 €		1.542.121,04 €
Cloud services for year	30.000,00 €	30.900,00 €	31.827,00 €	32.781,81 €	33.765,26 €	34.778,22 €	35.821,57 €	36.896,22 €	38.003,10 €	39.143,20 €		343.916,38 €
costs for transept using drones	600.000,00 €	618.000,00 €	636.540,00 €	655.636,20 €	675.305,29 €	695.564,44 €	716.431,38 €	737.924,32 €	760.062,05 €	782.863,91 €		10.525.865,01 €
<b>Total costs with EWS</b>	<b>1.681.500,00 €</b>	<b>844.520,00 €</b>	<b>787.455,60 €</b>	<b>811.079,27 €</b>	<b>835.411,65 €</b>	<b>860.474,00 €</b>	<b>886.288,22 €</b>	<b>912.876,86 €</b>	<b>940.263,17 €</b>	<b>968.471,06 €</b>	<b>997.525,19 €</b>	<b>10.525.865,01 €</b>
Incremental costs	1.681.500,00 €	2.526.020,00 €	3.313.475,60 €	4.124.554,87 €	4.999.968,51 €	5.820.440,51 €	6.706.726,72 €	7.619.605,59 €	8.559.868,75 €	9.528.339,82 €	10.525.865,01 €	

Considering a more intensive monitoring of microplastic with at least 1 survey per weer per transept, the overall total cost will be about 31.160.000 euro.

Component	Implementation time	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	total
<b>CAPEX</b>												
software	400.000,00 €											400.000,00 €
hardware	1.025.000,00 €											1.025.000,00 €
engineering	256.500,00 €											256.500,00 €
<b>OPEX</b>												
Operational assistance	80.000,00 €											80.000,00 €
Warranty/ maintenance services per year	134.520,00 €	138.555,60 €	142.712,27 €	146.993,64 €	151.403,45 €	155.945,55 €	160.623,91 €	165.442,63 €	170.405,91 €	175.518,09 €		1.542.121,04 €
Cloud services for year	30.000,00 €	30.900,00 €	31.827,00 €	32.781,81 €	33.765,26 €	34.778,22 €	35.821,57 €	36.896,22 €	38.003,10 €	39.143,20 €		343.916,38 €
costs for transept using drones	2.400.000,00 €	2.472.000,00 €	2.546.160,00 €	2.622.544,80 €	2.701.221,14 €	2.782.257,78 €	2.865.725,51 €	2.951.697,28 €	3.040.248,20 €	3.131.455,64 €		31.160.847,77 €
<b>Total costs with EWS</b>	<b>1.681.500,00 €</b>	<b>2.644.520,00 €</b>	<b>2.641.455,60 €</b>	<b>2.720.699,27 €</b>	<b>2.802.320,25 €</b>	<b>2.886.389,85 €</b>	<b>2.972.981,55 €</b>	<b>3.062.171,00 €</b>	<b>3.154.036,13 €</b>	<b>3.248.657,21 €</b>	<b>3.346.116,93 €</b>	<b>31.160.847,77 €</b>
Incremental costs	1.681.500,00 €	4.326.020,00 €	6.967.475,60 €	9.688.174,87 €	12.490.495,11 €	15.376.884,97 €	18.349.866,52 €	21.412.037,51 €	24.566.073,64 €	27.814.730,85 €	31.160.847,77 €	

### 3.6 Financial sustainability

Considering a normal data collection frequency (1 survey per month per transept), the overall existing costs amounts to about 42.645.000 euro in 10 Y. The expected costs using the EWS solution is about 10.525.000 euro in 10 Y, with a saving of about 32.120.000 euro.

Component	implementation time	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	total
<b>CAPEX</b>												
software	400.000,00 €											400.000,00 €
hardware	1.025.000,00 €											1.025.000,00 €
engineering	256.500,00 €											256.500,00 €
<b>OPEX</b>												
Operational assistance	80.000,00 €											80.000,00 €
Warranty/ maintenance services per year	134.520,00 €	138.555,60 €	142.712,27 €	146.993,64 €	151.403,45 €	155.945,55 €	160.623,91 €	165.442,63 €	170.405,91 €	175.518,09 €		1.542.121,04 €
Cloud services for year	30.000,00 €	30.900,00 €	31.827,00 €	32.781,81 €	33.765,26 €	34.778,22 €	35.821,57 €	36.896,22 €	38.003,10 €	39.143,20 €		343.916,38 €
costs for transept using drones	600.000,00 €	618.000,00 €	636.540,00 €	655.636,20 €	675.305,29 €	695.564,44 €	716.431,38 €	737.924,32 €	760.062,05 €	782.863,91 €		10.525.865,01 €
<b>Total costs with EWS</b>	<b>1.681.500,00 €</b>	<b>844.520,00 €</b>	<b>787.455,60 €</b>	<b>811.079,27 €</b>	<b>835.411,65 €</b>	<b>860.474,00 €</b>	<b>886.288,22 €</b>	<b>912.876,86 €</b>	<b>940.263,17 €</b>	<b>968.471,06 €</b>	<b>997.525,19 €</b>	<b>10.525.865,01 €</b>
Incremental costs	1.681.500,00 €	2.526.020,00 €	3.313.475,60 €	4.124.554,87 €	4.959.966,51 €	5.820.440,51 €	6.706.728,72 €	7.619.605,59 €	8.559.868,75 €	9.528.339,82 €	10.525.865,01 €	
<b>Existing costs for data collection and processing</b>		<b>3.720.000,00 €</b>	<b>3.831.600,00 €</b>	<b>3.946.548,00 €</b>	<b>4.064.944,44 €</b>	<b>4.186.892,77 €</b>	<b>4.312.499,56 €</b>	<b>4.441.874,54 €</b>	<b>4.575.130,78 €</b>	<b>4.712.384,70 €</b>	<b>4.853.756,24 €</b>	<b>42.645.631,04 €</b>
Incremental costs		3.720.000,00 €	7.551.600,00 €	11.498.148,00 €	15.563.092,44 €	19.749.985,21 €	24.062.484,77 €	28.504.359,31 €	33.079.490,09 €	37.791.874,79 €	42.645.631,04 €	
<b>SAVINGS USING EWS</b>		<b>1.193.980,00 €</b>	<b>3.044.144,40 €</b>	<b>3.135.468,73 €</b>	<b>3.229.532,79 €</b>	<b>3.326.418,78 €</b>	<b>3.426.211,34 €</b>	<b>3.528.997,68 €</b>	<b>3.634.867,61 €</b>	<b>3.743.913,64 €</b>	<b>3.856.231,05 €</b>	<b>32.119.766,03 €</b>

With an improved data collection frequency (1 survey per week per transept), the overall existing costs amounts to about 170.582.000 euro in 10 Y. The expected costs using the EWS solution is about 31.160.000 euro in 10 Y, with a saving of about 139.422.000 euro.

Component	implementation time	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	total
<b>CAPEX</b>												
software	400.000,00 €											400.000,00 €
hardware	1.025.000,00 €											1.025.000,00 €
engineering	256.500,00 €											256.500,00 €
<b>OPEX</b>												
Operational assistance	80.000,00 €											80.000,00 €
Warranty/ maintenance services per year	134.520,00 €	138.555,60 €	142.712,27 €	146.993,64 €	151.403,45 €	155.945,55 €	160.623,91 €	165.442,63 €	170.405,91 €	175.518,09 €		1.542.121,04 €
Cloud services for year	30.000,00 €	30.900,00 €	31.827,00 €	32.781,81 €	33.765,26 €	34.778,22 €	35.821,57 €	36.896,22 €	38.003,10 €	39.143,20 €		343.916,38 €
costs for transept using drones	2.400.000,00 €	2.472.000,00 €	2.546.160,00 €	2.622.544,80 €	2.701.221,14 €	2.782.257,78 €	2.865.725,51 €	2.951.697,28 €	3.040.248,20 €	3.131.455,64 €		31.160.847,77 €
<b>Total costs with EWS</b>	<b>1.681.500,00 €</b>	<b>2.644.520,00 €</b>	<b>2.641.455,60 €</b>	<b>2.720.699,27 €</b>	<b>2.802.320,25 €</b>	<b>2.886.389,85 €</b>	<b>2.972.981,55 €</b>	<b>3.062.171,00 €</b>	<b>3.154.036,13 €</b>	<b>3.248.657,21 €</b>	<b>3.346.116,93 €</b>	<b>31.160.847,77 €</b>
Incremental costs	1.681.500,00 €	4.326.020,00 €	6.967.475,60 €	9.688.174,87 €	12.490.495,11 €	15.376.884,97 €	18.349.866,52 €	21.412.037,51 €	24.566.073,64 €	27.814.730,85 €	31.160.847,77 €	
<b>Existing costs for data collection and processing</b>		<b>14.880.000,00 €</b>	<b>15.326.400,00 €</b>	<b>15.786.192,00 €</b>	<b>16.259.777,76 €</b>	<b>16.747.571,09 €</b>	<b>17.249.998,23 €</b>	<b>17.767.498,17 €</b>	<b>18.300.523,12 €</b>	<b>18.849.538,81 €</b>	<b>19.415.024,98 €</b>	<b>170.582.524,15 €</b>
Incremental costs		14.880.000,00 €	30.206.400,00 €	45.892.592,00 €	62.252.369,76 €	78.990.940,85 €	96.249.939,08 €	114.017.437,25 €	132.317.980,37 €	151.167.499,18 €	170.582.524,15 €	
<b>SAVINGS USING EWS</b>		<b>10.553.980,00 €</b>	<b>12.684.944,40 €</b>	<b>13.065.492,73 €</b>	<b>13.457.457,51 €</b>	<b>13.861.181,24 €</b>	<b>14.277.016,68 €</b>	<b>14.705.327,18 €</b>	<b>15.146.486,99 €</b>	<b>15.600.881,60 €</b>	<b>16.068.908,05 €</b>	<b>139.421.676,38 €</b>

In both cases, the introduction of EWS solution for microplastic is sustainable from the financial point of view taking into account the important savings introduced by the drones instead than the existing data collection methodology and processing.

## 4 Recommendation on future improvements

Based on the analysis in this document, considering the positive result of the project and the financial sustainability, with important savings, as future exploitation, main recommendation is to proceed asap with the implementation of the EWS based on national contribution from both countries. The implementation of the EWS solution allows in addition to reduce the CO<sub>2</sub> emissions, with saving that amount to about 5212 kg in case of surveys every month per transept, and to 20850 kg, in case of surveys every week per transept.

Task	CO <sub>2</sub> Produced [kg] per transept	total n. of surveys	Total CO <sub>2</sub> Produced [kg]
Existing data collection	17,5	300	5250
using a drone	0,125	300	37,5
savings			5212,5
Task	CO <sub>2</sub> Produced [kg] per transept	total n. of surveys	Total CO <sub>2</sub> Produced [kg]
Existing data collection	17,5	1200	21000
using a drone	0,125	1200	150
savings			20850

The introduction of the solution allows in addition to process data within 1 day, instead that 30 days as it is now.

Other specific general comments from stakeholders about the solution are the following:

- the platform is an excellent tool that has the potential to evolve and as such be useful to many stakeholders. I think that only minor modifications and additions are needed to make the platform even more intuitive for all users, both those who will fill it with data and those who will use it later
- the EWS platform as an excellent starting point for such a diverse range of issues as microplastics. Certainly, through its longer use we will see all its advantages, as well as those things that will be possible to improve
- The EWS platform seems to be easy to use and very intuitive. As specified during the training needs more details such as:
  - o the visualization near the maps of a legend that facilitates the understanding of the map itself (i.e. colors' gradation linked to values);
  - o to specify the measurement units in graphs/tables showed.
- There is a very interesting section related to sea's sentinels that obviously needs a greater dissemination not only between the stakeholders.
- For section related to the manual uploading of lab analysis data, it would be useful to have a format that can be used by different users in order to have a uniformity in data collection.

- In case of future exploitation, some improvements are required to allow a full exploitation.