

# Decarbonisation of the fishing fleet in the Mediterranean and Black Sea



MEDAC Meeting

*Framework Contract for the provision of  
scientific advice for the Mediterranean  
and the Black Sea*



Funded by  
the European Union

Hybrid meeting  
Rome, 9 April 2024







Funded by  
the European Union

Framework Contract for the provision of scientific advice for the Mediterranean and the Black Sea

Specific Contract No. 7



# Decarbonisation of the fishing fleet in the Mediterranean and Black Sea - *DecarbonyT* -

*Start decarbonization journey in fisheries · Track carbon emissions ·  
Visualize emission hotspots · Foster collaboration ·  
Work across the harvesting chain*

**Antonello Sala**

*Senior scientist “National Research Council (CNR)”*





## Project partners and subcontractors

PARTNER OR SUBCONTRACTOR	INSTITUTE	COUNTRY	SCIENTIFIC RESPONSIBLE	SUBTASKS INVOLVEMENT
P1. CNR	Partner 1. National Research Council	ITALY	ANTONELLO SALA (PROJECT COORDINATOR)	1A,B,C,D,E; 2C,F,G; 3A,B,C,D
P2. ABT	Partner 2. AquaBioTech Group	MALTA	ALFONSO SICILIANO	1A, 3A,B
P3. CIBM	Partner 3. Consortium for the Inter-University Centre of Marine Biology and Applied Ecology	ITALY	MARIO SBRANA	1A,B,C; 2B; 3A,B,C,D
P4. COISPA	Partner 4. COISPA Foundation	ITALY	ISABELLA BITETTO	1A, 2D; 3A,B,C,D
P5. CONISMA	Partner 5. National Inter-University Consortium for Marine Sciences	ITALY	TOMMASO RUSSO	1A,B,C
P6. FRI	Partner 6. Fisheries Research Institute	GREECE	EMMANOUIL KOUTRAKIS	1A,B; 2H; 3A,B,C,D
P7. HCMR	Partner 7. Hellenic Centre for Marine Research	GREECE	ALEXIS CONIDES	1A,B,C; 2H; 3A,B,C
P8. ICM-CSIC	Partner 8. Institute of Marine Science - Spanish National Research Council	SPAIN	MIQUEL ORTEGA CERDÀ	3A,B,D
P9. IEO-CSIC	Partner 9. Institute of Oceanography - Spanish National Research Council	SPAIN	FRANCESC ORDINAS	1A,B,C,D; 2A; 3A,B
P10. IO-BAS	Partner 10. Institute of Oceanology-Bulgarian Academy of Sciences	BULGARIA	VIOLIN RAYKOV	1A, 2I,J,K; 3A,B
P11. IOF	Partner 11. Institute of Oceanography and Fisheries	CROATIA	NEDO VRGOC	1A,B,C; 2E
P12. NIMRD	Partner 12. National Institute for Marine Research and Development	ROMANIA	DANILOV CRISTIAN SORIN	1A, 2I,J,K; 3A,B
P13. NISEA	Partner 13. NISEA Società Cooperativa	ITALY	PAOLO ACCADIA	3A,B,C,D
P14. SZN	Partner 14. Zoological Station of Naples	ITALY	CRISTINA MANGANO	1A; 2B
P15. UTH	Partner 15. University of Thessaly	GREECE	CHRISTOS MARAVELIAS	1A,D; 2E
P16. WWF	Partner 16. WWF Mediterranean	ITALY	MARCO COSTANTINI	3A,B,C
S1. DIFFERENS	DIFFERENS DIGITAL, MARKETING, INNOVATION	ITALY	ANDREA ROSINI	1D



# Overview of the *DecarboonyT* project

Task 0. Project management and scientific coordination

*(Antonello Sala)*

Task 1. Review of the state of play

*(Tommaso Russo)*

Task 2. Pilot project for improved fishing gears development and testing at sea

*(Antonello Sala / Beatriz Guijarro)*

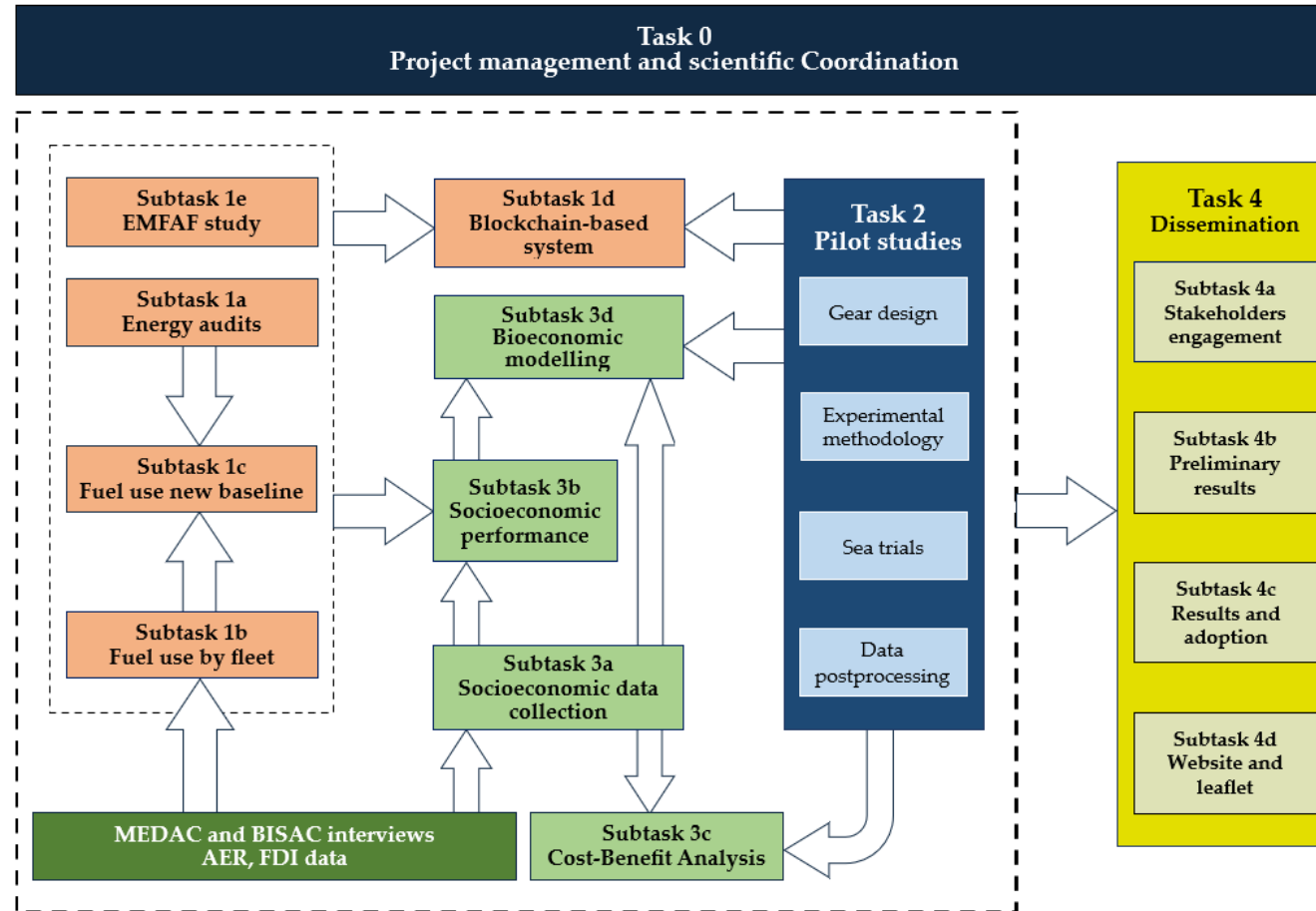
Task 3. Socio-economic analysis and conclusions from gear testing

*(Paolo Accadia)*

Task 4. Dissemination and stakeholder engagement

*(Marco Costantini)*

# Project structure



# Task 1. Review of the state of play

## Subtask 1a. Existing research on gear modifications towards the decarbonisation of the Mediterranean and Black Sea trawling fleet

Emilio Notti

**Energy audits** will be implemented to establish baselines in the area/gear combinations

Pilot studies in the selected area (GSA) and fishing gear combinations

Area	GFCM GSA	Fishing gear
Western Mediterranean	GSA1-7	OTB
Tyrrhenian	GSA9-10	OTB
Central Mediterranean	GSA15-16	OTB
Adriatic and Ionian	GSA17-19	OTB, TBB, <del>PTM</del>
Eastern Mediterranean	GSA22-23	OTB
Black Sea	GSA29	OTB, TBB, OTM

The energy audit surveys will be carried out on a sample of **ten fishing vessels in each area/gear combination** stratified by vessel length and engine power.

A **standard layout** for the information collection will be settled during the first coordination meeting (*Orientation meeting*)



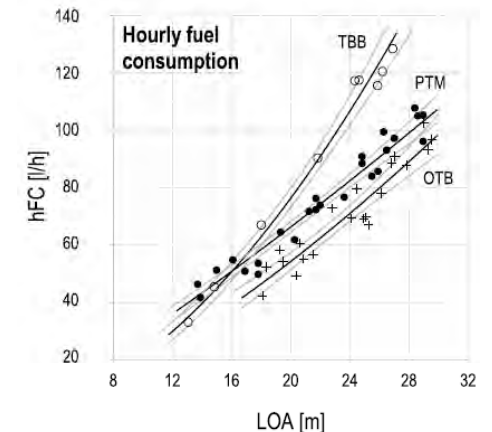
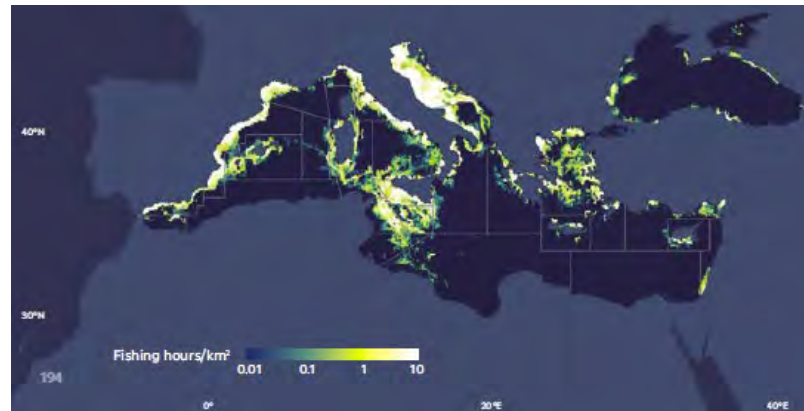
# Task 1. Review of the state of play

## Subtask 1b. Analysis of the fuel consumption and carbon emissions by fleet/gear and area

*Tommaso Russo*

Integrated analysis of Fisheries Dependent Information (FDI) data and Annual Economic Report (AER) on the EU Fishing Fleet

Carbon footprint of fishing vessels, according to their spatial behaviour and fishing strategies (using remote tracking device data) coupled with models developed in Sala *et al.* (2022)







# Task 1. Review of the state of play

## Subtask 1c. Identification of baselines of fuel consumption by gear/area

*Anna Nora Tassetti*

To identify new baselines of fuel consumption from vessels employing experimental gears.

Energy consumption data from individual vessels obtained in the pilot project for improved fishing gears development and testing at sea (Task 2) and energy audits implemented in Subtask 1a will be analysed to determine baselines of fuel consumption by gear/area combination (including steaming and fishing phases) to update where possible, the results described by Sala *et al.* (2022)



# Task 1. Review of the state of play

## Subtask 1d. Analyses of other relevant elements that could contribute to the decarbonization of the trawling fishing fleet

Andrea Rosini

An innovative blockchain-based system will be designed and developed to measure and track the degree of carbon footprint mitigation of innovative and improved gears and fishing practice solutions.

The mitigation of GHG emissions introduced by the innovations identified and tested in Task 2 can be compared with industry baselines (CO<sub>2</sub>eq per catch tons) and recorded in form of Non-Fungible Token (NFT) on the blockchain, which is an inviolable and unalterable register to guarantee the integrity of all the data and information.

Managers may set incentives - including subsidies, tax breaks, or other forms of financial measures – to support proven sustainable low carbon footprint fisheries and promote fleet decarbonization.





# Task 1. Review of the state of play

## Subtask 1e. Analysis of the results of the ongoing EMFAF study on ‘Technological-economic analysis for the energy transition of the fisheries and aquaculture sectors’

*Maria Cristina Mangano*

A comprehensive list of the existing projects/scientific evidence/recommendations and guidelines exploiting the energy transition in EU fisheries sectors will be created.

The outcome will allow to generate a map of the existing gaps (e.g., gaps in existing knowledge, low market-readiness for certain types of innovations, need for new skills, and sufficient and accessible financing opportunities) or rather, potential barriers to the further development and wide uptake of the necessary technologies.



## Task 3. Socio-economic analysis and conclusions from gear testing

### Subtask 3a. Data collection for socio-economic analysis

*Paolo Accadia*

Economic and social data will be collected for each of the fleet segments selected for pilot studies under Task 2 to be analysed under the Subtask 3b, CBA of Subtask 3c, BEMTOOL (GSA17-19) and ECOPATH (GSA6) of Subtask 3d.

A **specific data call** will be launched to Member States by DGMARE with the support of the Consortium to have the data in the appropriate level of detail (e.g., GSA).

Detailed data will be collected during the pilot studies for those fishing strategies and ports in which they will be carried out.





## Task 3. Socio-economic analysis and conclusions from gear testing

### Subtask 3b. Analysis of the impacts of recent variations in fuel price on fisheries economic performance

*Angelos Liontakis*

Time series data collected under Subtask 3a will be analysed with a focus on the socioeconomic impact of fuel price variations observed in recent years.

The analysis will not only focus on the profitability but will expand to cover various socioeconomic indicators such as the Gross Value Added and labour productivity which is a key measure of economic efficiency and a measure of fishers' prosperity.

The Subtask 3b will provide a description of the socioeconomic performance for each fleet segment included in the list of pilot studies defined under Task 2.

The outcomes of the subtask will be transferred to Subtask 3d for the bio-economic modelling.



## Task 3. Socio-economic analysis and conclusions from gear testing

### Subtask 3c. Cost-Benefit Analysis on the simulated technical innovations

*Paolo Accadia*

A short-term economic analysis on the cost of upgrading to less fuel intensive towed gear for each of the pilot studies defined under Task 2 will be carried out through a CBA.

This CBA is aimed to measure the economic impact realistically expected by a vessel owner, who wants voluntarily to implement one of the technical innovations defined under Task 2.

The CBA will cover a number of years sufficient to estimate the operational savings from the new gear and assess the time needed to absorb the initial economic investment.

The CBA will produce a set of profitability indicators for each pilot study, which will be presented and discussed with stakeholders.



## Task 3. Socio-economic analysis and conclusions from gear testing

### Subtask 3d. Evaluation of biological and economic impact of upgrading less fuel intensity towed gears in the short-medium-long term

*Isabella Bitetto*

This Subtask is aimed at investigating the consequences of the implementation of less fuel intensity fishing gears in the trawl fisheries, using biological, impact and economic indicators.

The approach will be based on simulations and scenarios' modelling to predict short-, medium- and long-term changes, using BEMTOOL bio-economic model in GSA17,18,19 and Ecopath, with Ecosym and Ecospace in GSA6.



## Task 2. Pilot project for improved fishing gears development and testing at sea

### Goals and outcomes

- Field work will be conducted to collect data on energy use during fishing operations
- To develop fuel-saving fishing gears in trawl fisheries
- To focus exclusively on parts of the fishing gears: warps, bridles, otterboards, sledges in case of beam trawls, net design, material, webbing and rigging
- To carry out sea trials in different GSAs in the Mediterranean and Black Sea

**Experimental fishing gear systems that will ensure fuel consumption reduction between 20-40% or the maximum achievable fuel efficiency**

## Task 2. Pilot project for improved fishing gears development and testing at sea

### Methodological approach

- Comparative trials of conventional vs the new gear (Sala *et al.* 2011; 2022)
- Catch profile: total catch, catch by species, and length distribution of the main commercial species
- Gear performance parameters:
  - ❖ door spread, horizontal and vertical net openings (gear monitoring system)
  - ❖ Warp loads (electronic load cells)
  - ❖ Door and net resistance (underwater load cells)
- Fuel consumption and emissions (fuel flowmeters)
- GPS to determine the position and speed of the vessel



## Task 2. Pilot project for improved fishing gears development and testing at sea

Pilot	Subtask / Area (GSA) / Gear	Subtask leader	Partner(s) involved	Topic(s)
1	Subtask 2a. Western Mediterranean (GSA1-7), OTB	Francesc Ordines	IEO-CSIC	Midwater doors; fuel saving net design
2	Subtask 2b. Tyrrhenian (GSA9-10), OTB	Mario Sbrana	CIBM, SZN, CONISMA	Novel otterboards (flying doors)
3	Subtask 2c. Central Mediterranean (GSA15-16), OTB	Sergio Vitale	CNR, ABT	Novel trawl design with high strength material and large meshes in the forward nettings, replacement of groundgear with bobbins to reduce friction. Conventional (e.g., polyamide, polyethylene) vs new high-strength materials in the bridles and warps.
4	Subtask 2d. Adriatic and Ionian (GSA17-19), OTB	Pierluigi Carbonara	COISPA, CNR, CONISMA	Semi-pelagic otterboards; thinner twines, high-strength material (e.g., Dyneema®). Alternative groundrope constructions (e.g., sheering plates, drop chains)
5	Subtask 2e. Adriatic and Ionian (GSA17-19), OTB	Nedo Vrgoc	IOF, CNR	New net design, semi-pelagic otterboards, high strength material
6	Subtask 2f. Adriatic and Ionian (GSA17-19), TBB	Alessandro Lucchetti	CNR	New net design, reduction of the board inclination, the overall gear weight, and towing speed, replace the bottom-side chafer (EC Regulation 3440/1984) made of rubber with meshed netting
7	Subtask 2g. Eastern Mediterranean (GSA22-23), OTB	Alexis Conides	HCMR, FRI	Flying doors
8	Subtask 2h. Black Sea (GSA29), OTB	Violin Raykov	IO-BAS, NIMRD	Transfer of technology from advanced fisheries: more efficient otterboards and trawl design
9	Subtask 2i. Black Sea (GSA29), OTM	Cristian Danilov	IO-BAS, NIMRD	New net design and use of high strength material in the forward trawl nettings
10	Subtask 2j. Black Sea (GSA29), TBB	Violin Raykov	IO-BAS, NIMRD	The conventional 8 m beam trawl will be contrasted with the Turkish <i>Rapana</i> trawl-like and with a novel light beam (width of 4-5 m)



## Low Impact and Fuel Efficient (LIFE) fishing

Several studies have highlighted practical examples and ongoing developments within the broader shipping industry, showcasing their potential for technology transfer in the Mediterranean and Black Sea fisheries to reduce fuel consumption and gains in fuel saving

- Larger meshes in the herding parts of the trawl..... 10-15%
- Stronger and lower-drag netting materials.....5-12%
- Hydrodynamically efficient trawl doors.....16-28%
- Reduced drag in floats and ground gears.....1-7%
- Multitrawl rigging..... 10-15%
- Reduced towing and/or sailing speed..... 5-10%



## Innovations and strategies to enhance energy efficiency

Solutions are available, funding ready and regulations in place but implementation of solutions is very low at EU level due to several barriers

- Objectives being achievable and realistic
- Making industries part of the solution (*proactive mode*)
- Adequate training and technical assistance
- Rewarding best practices and redirecting fuel subsidies to encourage the development of energy-saving practices
- No realistic alternatives available to trawling for capturing certain species
- Developing acceptable technology and creating incentives (*win-win situations*)

# Task 4. Dissemination and stakeholder engagement

## Subtask 4a. Presenting the study and ensuring full engagement of stakeholders

Marco Costantini

Objective: full engagement of stakeholders from the Mediterranean and Black Sea

Presentation: aims and methodologies

Participatory workshop (M1): organized after the Inception Report

Participants: stakeholders from both the Mediterranean (MEDAC) and the Black Sea (BLSAC)

Timing and Work Breakdown Structure of the DecarbonyT Project		2023												2024											
Task / Subtask	Task and Subtask Description / Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Task 4. Dissemination and stakeholder engagement																									
4a	Presenting the study and ensuring full engagement of stakeholders						M1																		
4b	Discussing preliminary results and collect qualitative information on the impact of fuel cost increase on the sector													M2											
4c	Presenting results of the study and discussing the adoption of gear modifications																		M3					M4	



# Task 4. Dissemination and stakeholder engagement

## Subtask 4b. Discussing preliminary results and collect qualitative information on the impact of fuel cost increase on the sector

Maria Cristina Mangano

Objective: presenting preliminary results to stakeholders from both the Mediterranean (MEDAC) and the Black Sea (BLSAC)

Presentation: preliminary potential fuel efficiency gains, pros and cons of each innovation tested

Participatory workshop (M2): collecting information (questionnaires and interviews) on solutions adopted by the fishing sector

		Timing and Work Breakdown Structure of the DecarbonyT Project																							
		2023												2024											
Task / Subtask	Task and Subtask Description / Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Task 4. Dissemination and stakeholder engagement																									
4a	Presenting the study and ensuring full engagement of stakeholders						M1																		
4b	Discussing preliminary results and collect qualitative information on the impact of fuel cost increase on the sector												M2												
4c	Presenting results of the study and discussing the adoption of gear modifications																		M3					M4	





# Task 4. Dissemination and stakeholder engagement

## Subtask 4c. Presenting results of the study and discussing the adoption of gear modifications

Marco Costantini

Objective: presenting results to MEDAC and BLSAC stakeholders

Presentation: potential fuel efficiency gains, pros and cons of each innovation tested

Participatory workshop (M4): third final project workshop, with results presented also at the annual meeting of the GFCM WGFiT (M3)

Timing and Work Breakdown Structure of the DecarbonyT Project

Task / Subtask	Task and Subtask Description / Month	2023												2024											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Task 4. Dissemination and stakeholder engagement																									
4a	Presenting the study and ensuring full engagement of stakeholders						M1																		
4b	Discussing preliminary results and collect qualitative information on the impact of fuel cost increase on the sector																								
4c	Presenting results of the study and discussing the adoption of gear modifications																								



# Task 4. Dissemination and stakeholder engagement

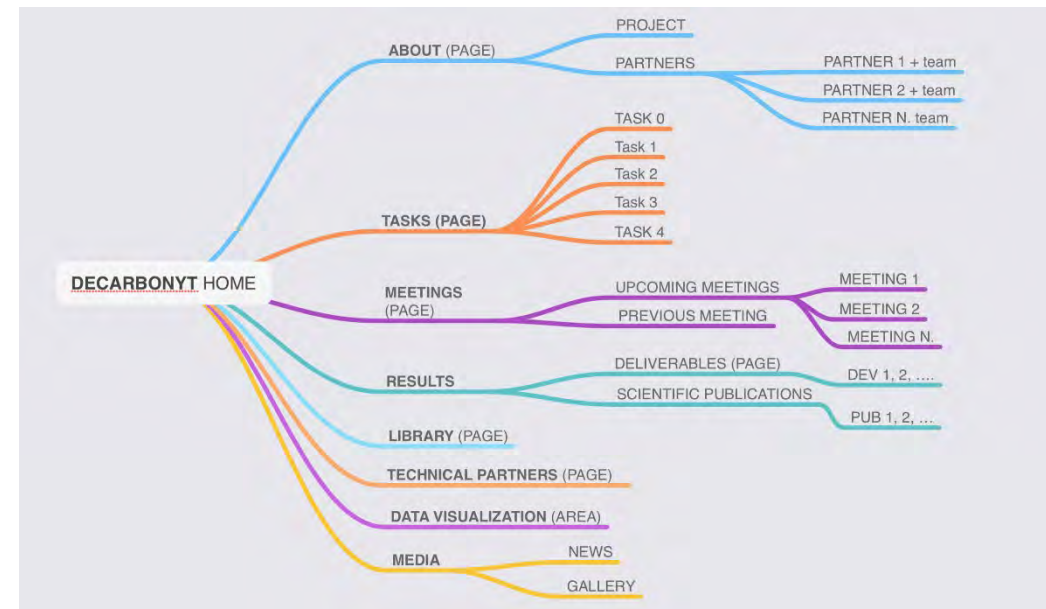
## Subtask 4d. Create and maintain a project website and produce a Project Leaflet

Andrea Rosini

Logo



Website <https://www.decarbonyt.eu>





# DecarbonyT

DECARBONISATION OF THE FISHING FLEET  
IN THE MEDITERRANEAN AND BLACK SEA

# Thank you for your attention

**Antonello Sala**  
National Research Council (CNR)

Email: [antonello.sala@cnr.it](mailto:antonello.sala@cnr.it)

**Specific contract No. 7**  
**Decarbonisation of the fishing fleet in the Mediterranean and Black Sea (*DecarbonyT*)**



Funded by  
the European Union

*Framework Contract for the provision of scientific advice for the Mediterranean and the Black Sea*  
FRAMEWORK CONTRACT – EASME/EMFF/2020/OP/0021

