



# Governing the oceans of tomorrow: How ocean monitoring delivers on the blue arm of the Green Deal

June 22, 2022 | 09:00 - 10:00 CEST | MS Teams

TALKING BLUE SUSTAINABILITY



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# AGENDA

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09:00

Welcome and introduction by Carlos Jahn  
Head of Fraunhofer Center for Maritime Logistics and Services CML

09:10

Setting the scene by Rasmus Andresen  
Patron of the webinar, Member of the European Parliament

09:20

Expert presentation "Managing hyper-connectivity and data complexity in the ocean towards effective policy"  
Nuno Loureiro, Head of Data Science and Development, CoLAB +Atlantic  
Josephine Sassen, Senior Integrating Scientist, TNO

09:45

Discussion

10:00

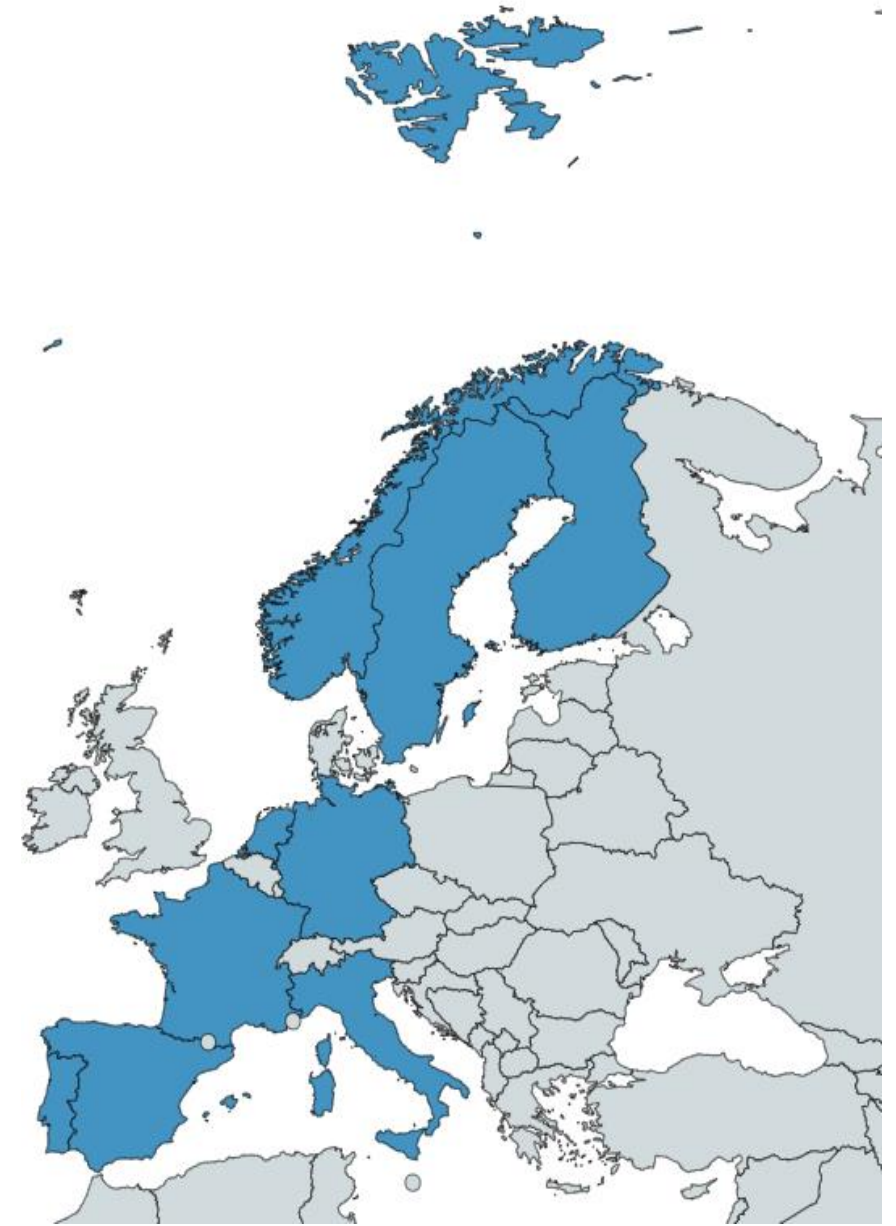
End of event

# TALKING BLUE SUSTAINABILITY



**Carlos Jahn**

Head of Fraunhofer Center for  
Maritime Logistics and Services CML  
Fraunhofer-Gesellschaft



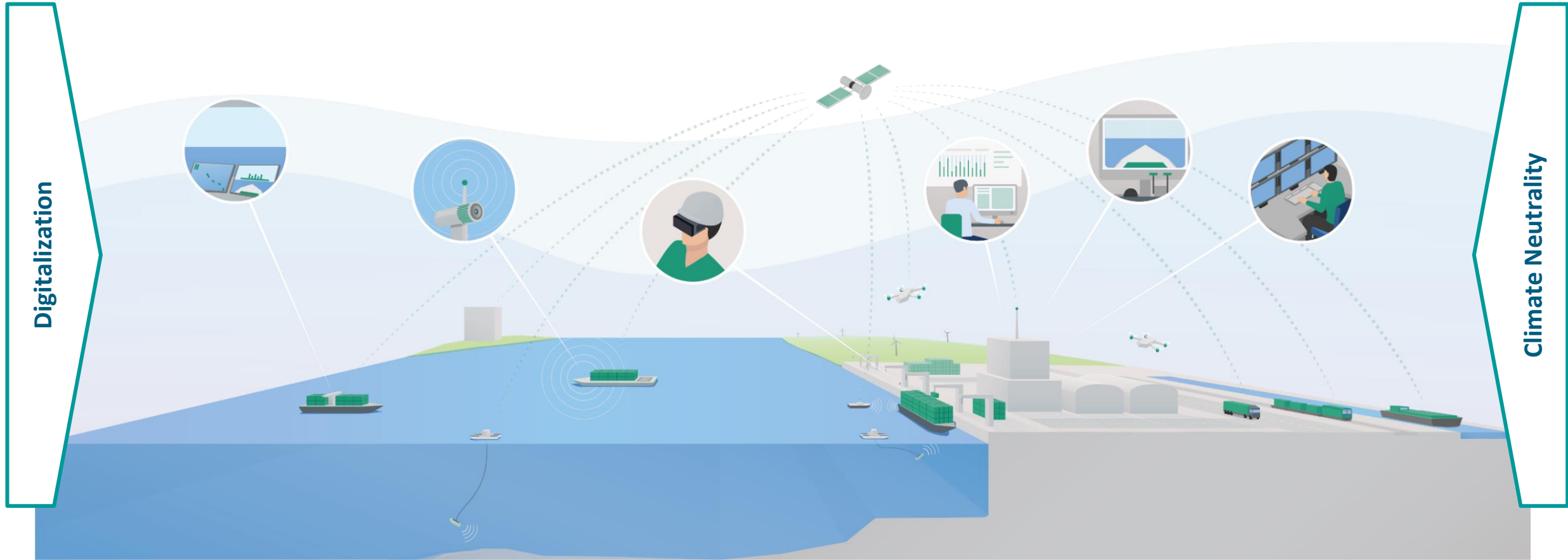
Fraunhofer CML in Hamburg

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# Innovating the Maritime Sector

# Fraunhofer CML: Innovating the Maritime Sector

Making shipping, ports and logistics safer, more efficient and more sustainable



Digitalization

Climate Neutrality

The oceans are vital to humans and are used in many ways:



**Food**



**Energy**



**Materials**



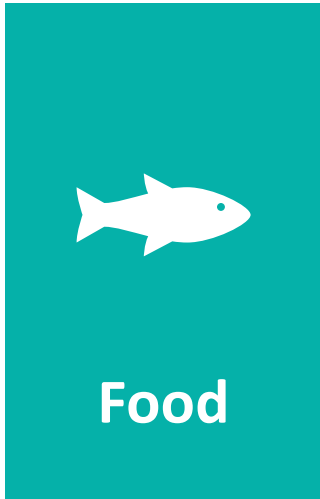
**Tourism**



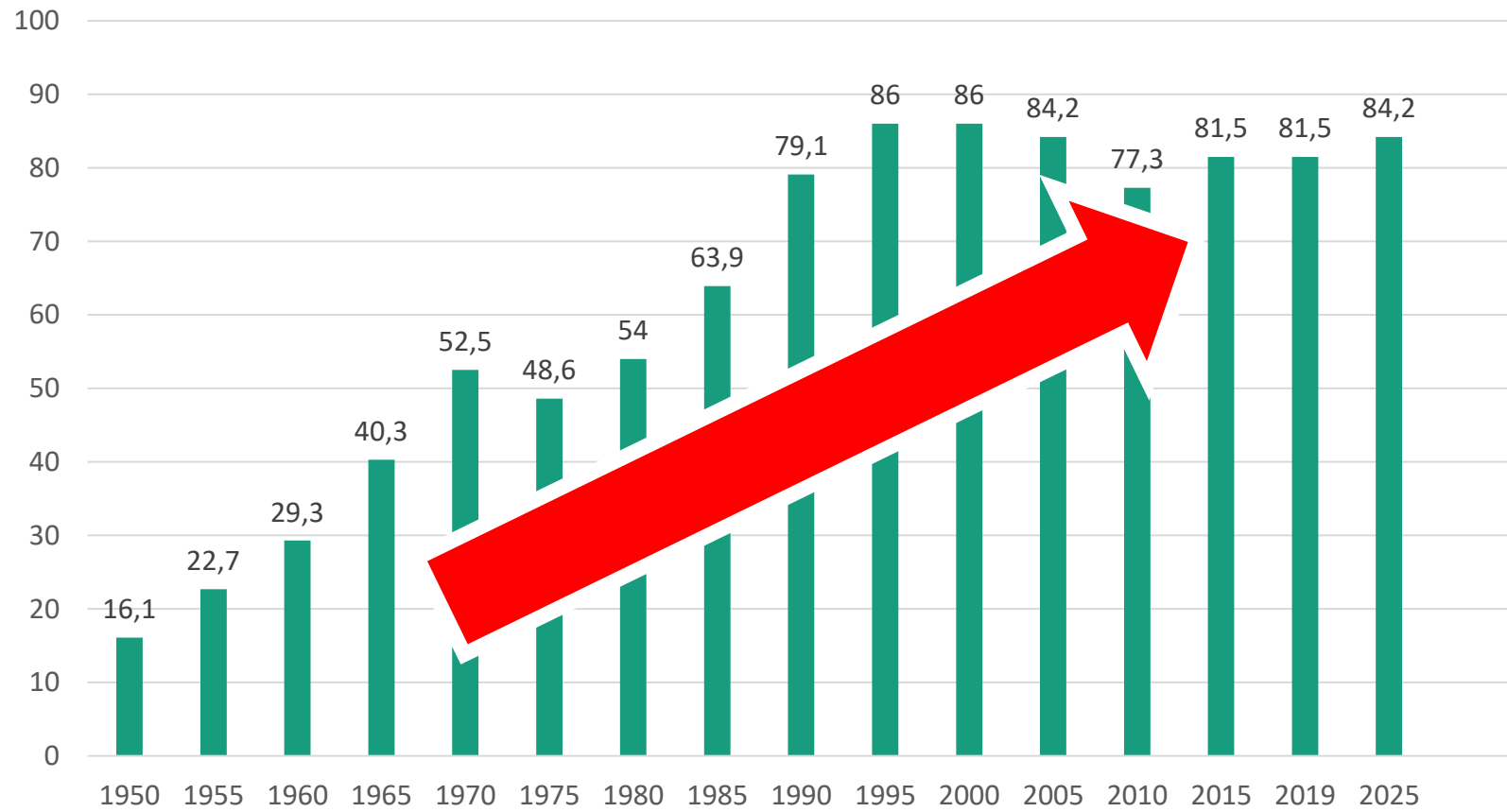
**Transport**

# Development of Fishing

The constant consumption of fish grows with the world population

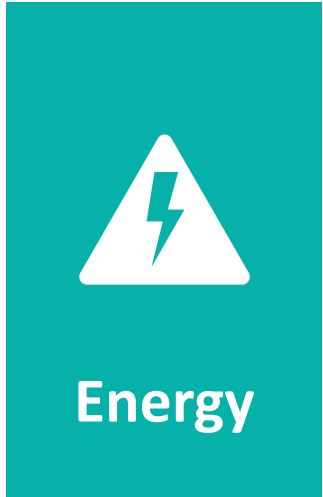


Catch of all marine organisms worldwide in million metric tons

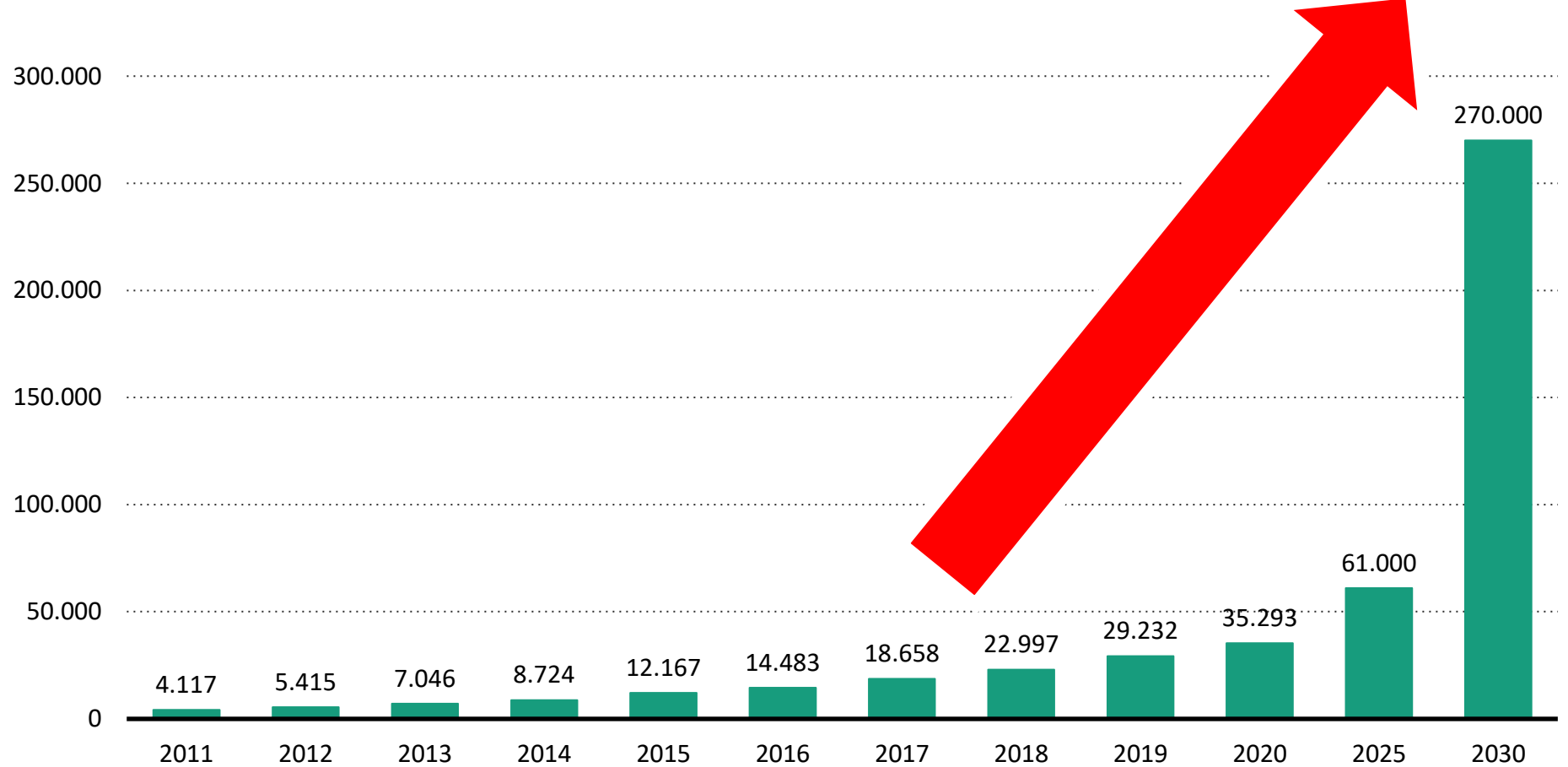


# Development of Wind Turbines Offshore

Strong expansion anticipated



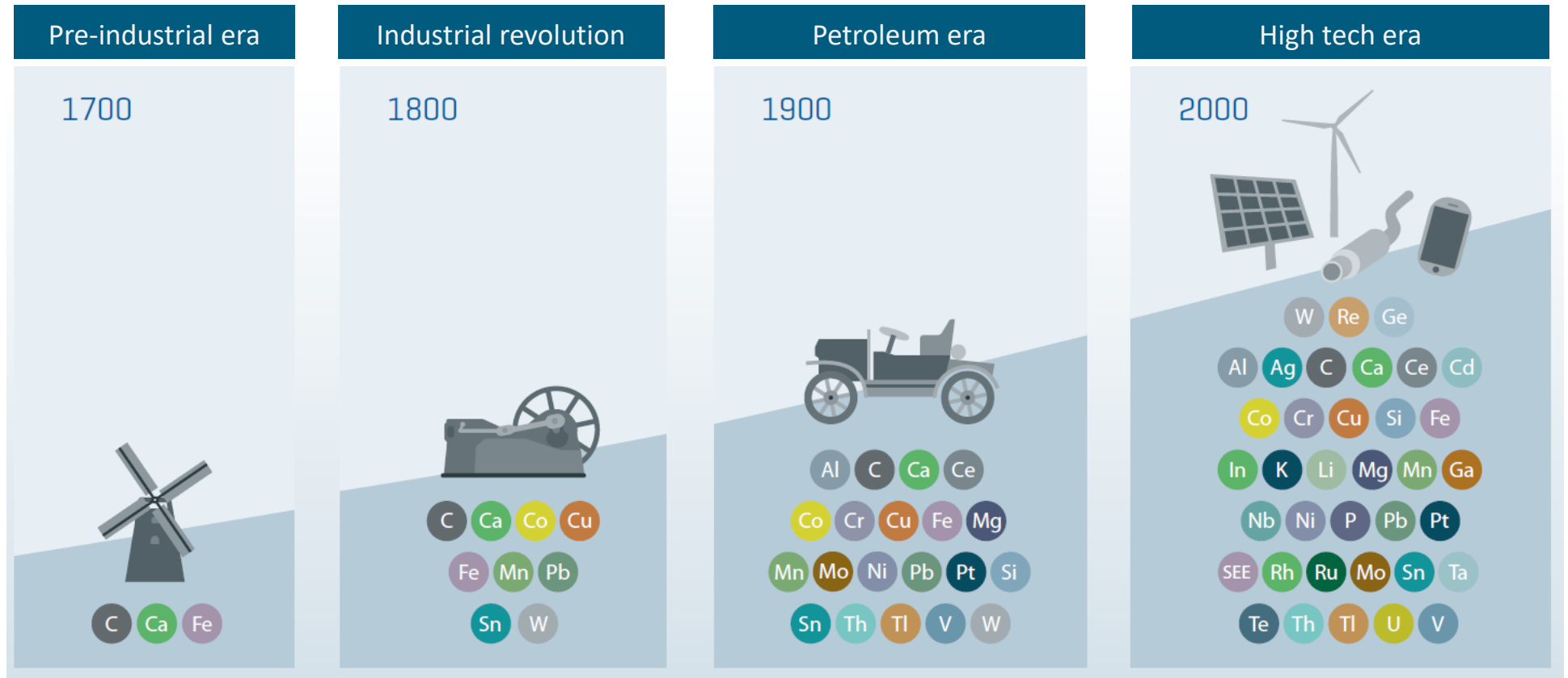
Installed capacity offshore wind energy in Megawatt (global)





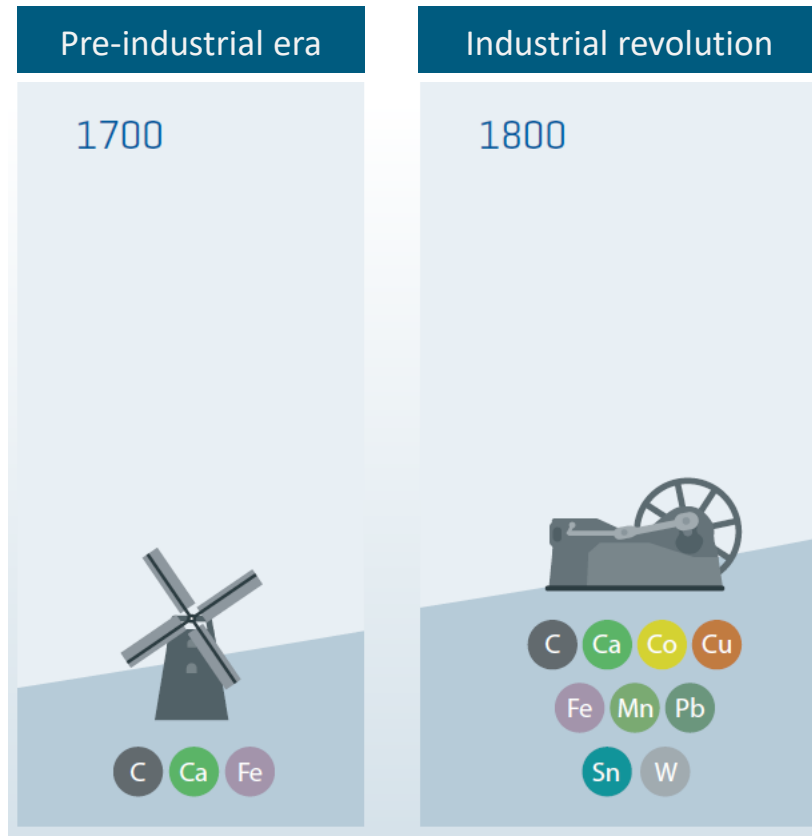
# Offshore Production Oil, Gas and Raw Materials

The world's hunger for raw materials continues to grow



# Offshore Production Oil, Gas and Raw Materials

## The world's hunger for raw materials continues to grow

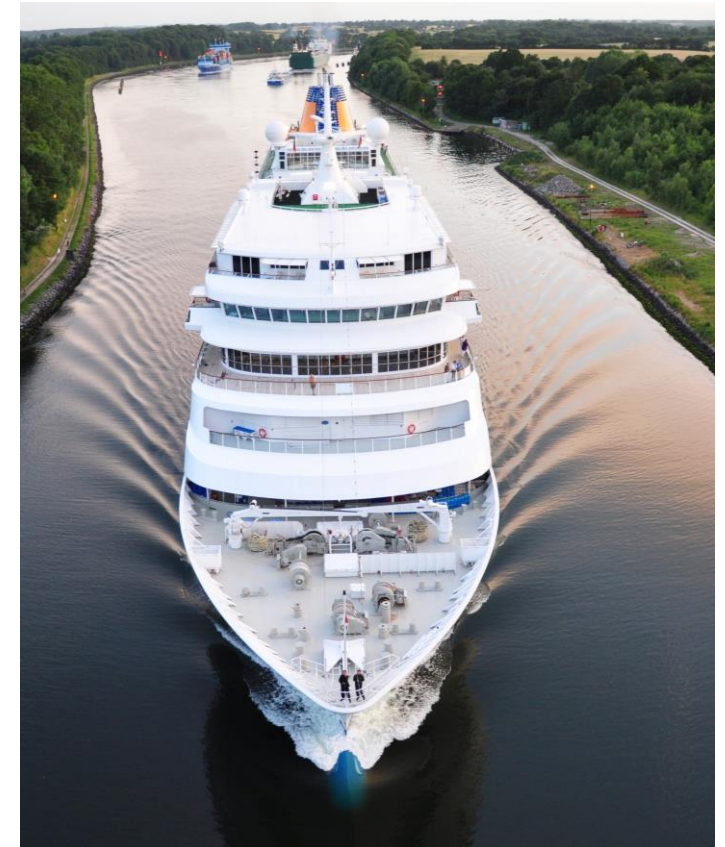
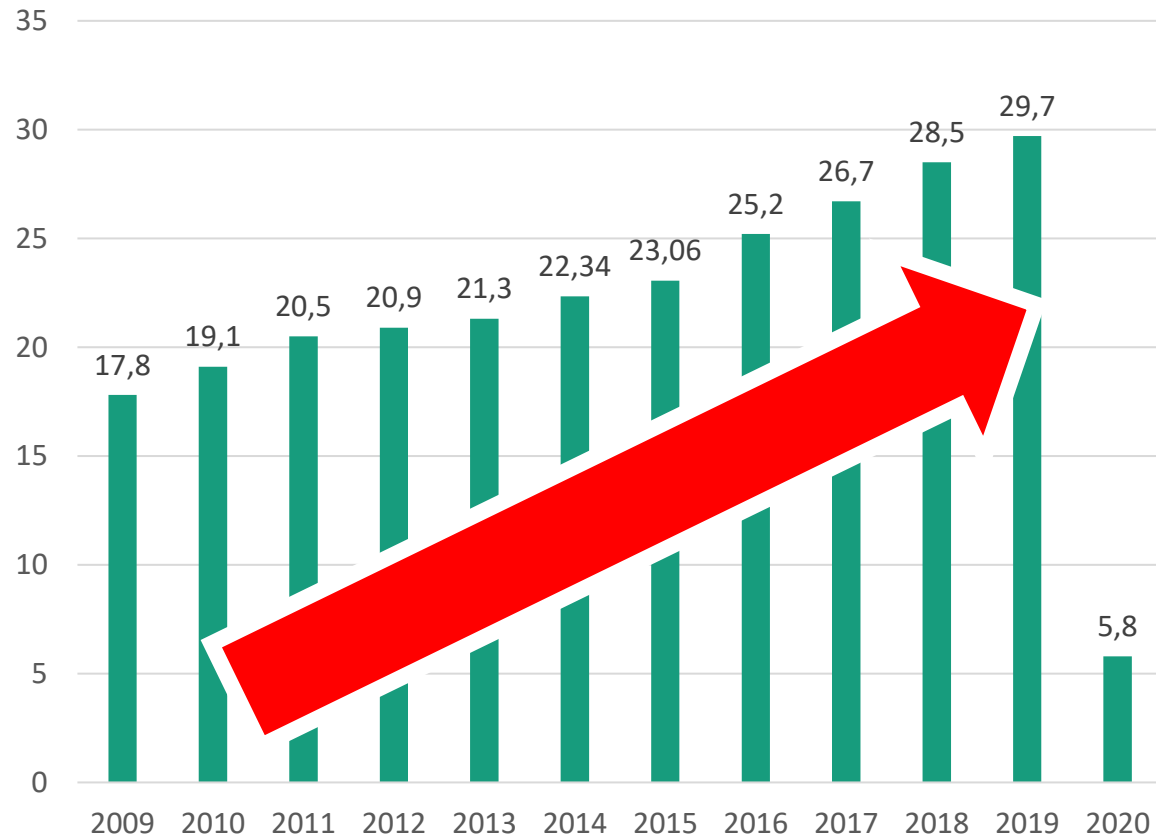


# Development of Cruise Ship Passengers

The industry suffers from the aftermath of the COVID pandemic



Number of Cruise Ship Passengers in Mio.

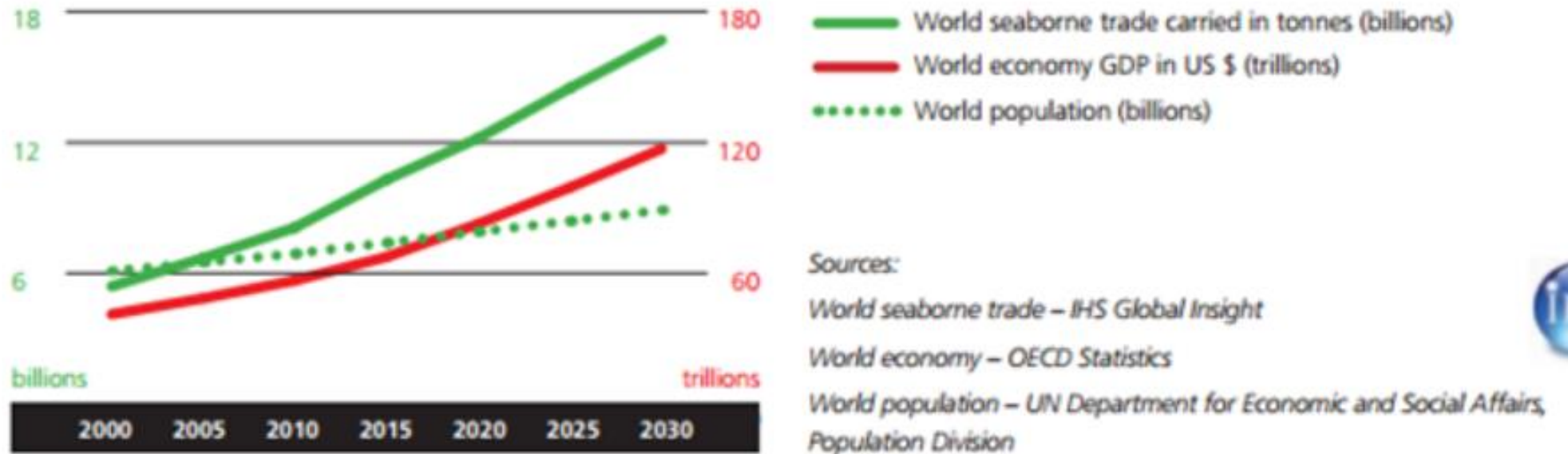


# Development of World Seaborne Trade

Permanent growth



## PREDICTED INCREASES IN WORLD SEABORNE TRADE, GDP AND POPULATION



Graph to show the predicted increases in world seaborne trade GDP and population

The oceans are vital to humans and are used in many ways...

...but the use of the oceans by humans has many consequences.



**Food**



**Energy**



**Materials**



**Tourism**



**Transport**

# Solutions for the sustainable use of the oceans

## ISSS: Enabler to develop new and capable technologies





ISSS Objectives:  
Research solutions, jointly  
addressed by Europe's  
biggest research entities

# Innovation Platform Sustainable Sea and Ocean Solutions ISSS

## Intelligent Technologies for the Blue Economy



Ten major European RTOs working together:

SINTEF Ocean (Norway)

VTT (Finland)

RISE (Sweden)

Fraunhofer (Germany)

TNO (Netherlands)

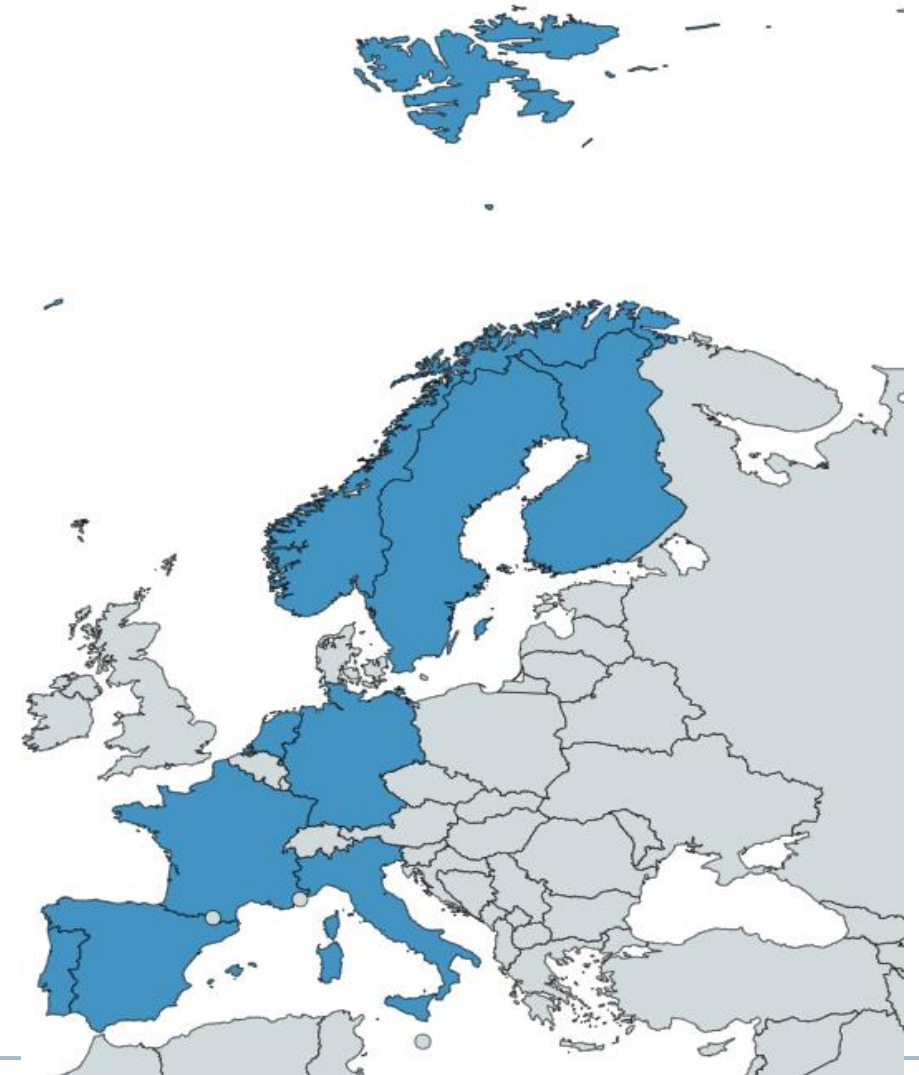
Ifremer (France)

AZTI (Spain)

TECNALIA (Spain)

ENEA (Italy)

CoLAB +ATLANTIC (Portugal)







## Aquaculture

Sustainable use of marine living resources, blue biotechnology



## Ocean Cleaning

Prevention and removal of marine litter (such as plastic waste), prevention and monitoring of pollution, monitoring and removal of unexploded ordnance



## Energy and Raw Materials Harvesting

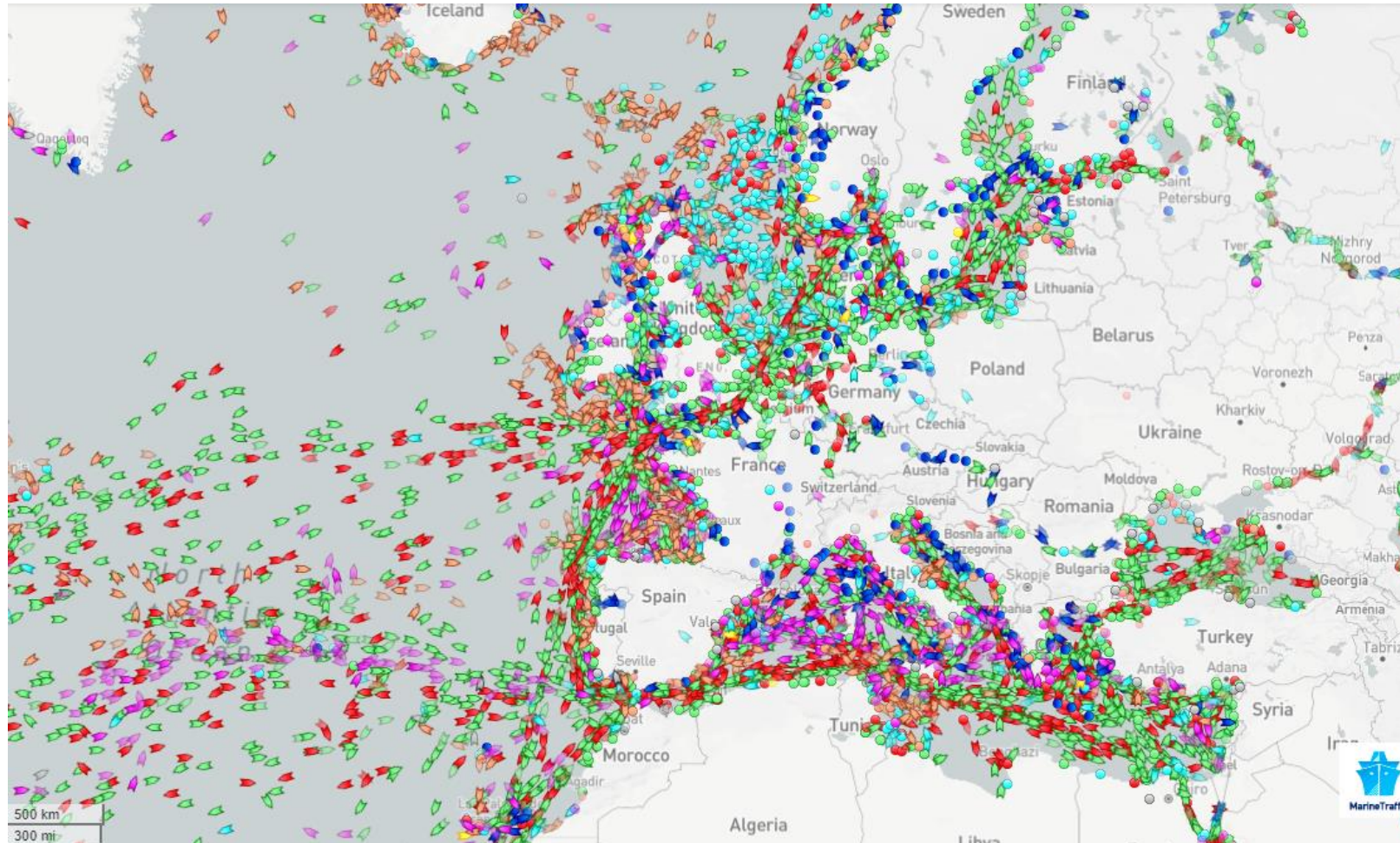
Renewable energy (offshore wind, ocean energy), sustainable use of marine non-living resources



## Examples of relevant research projects of Fraunhofer CML

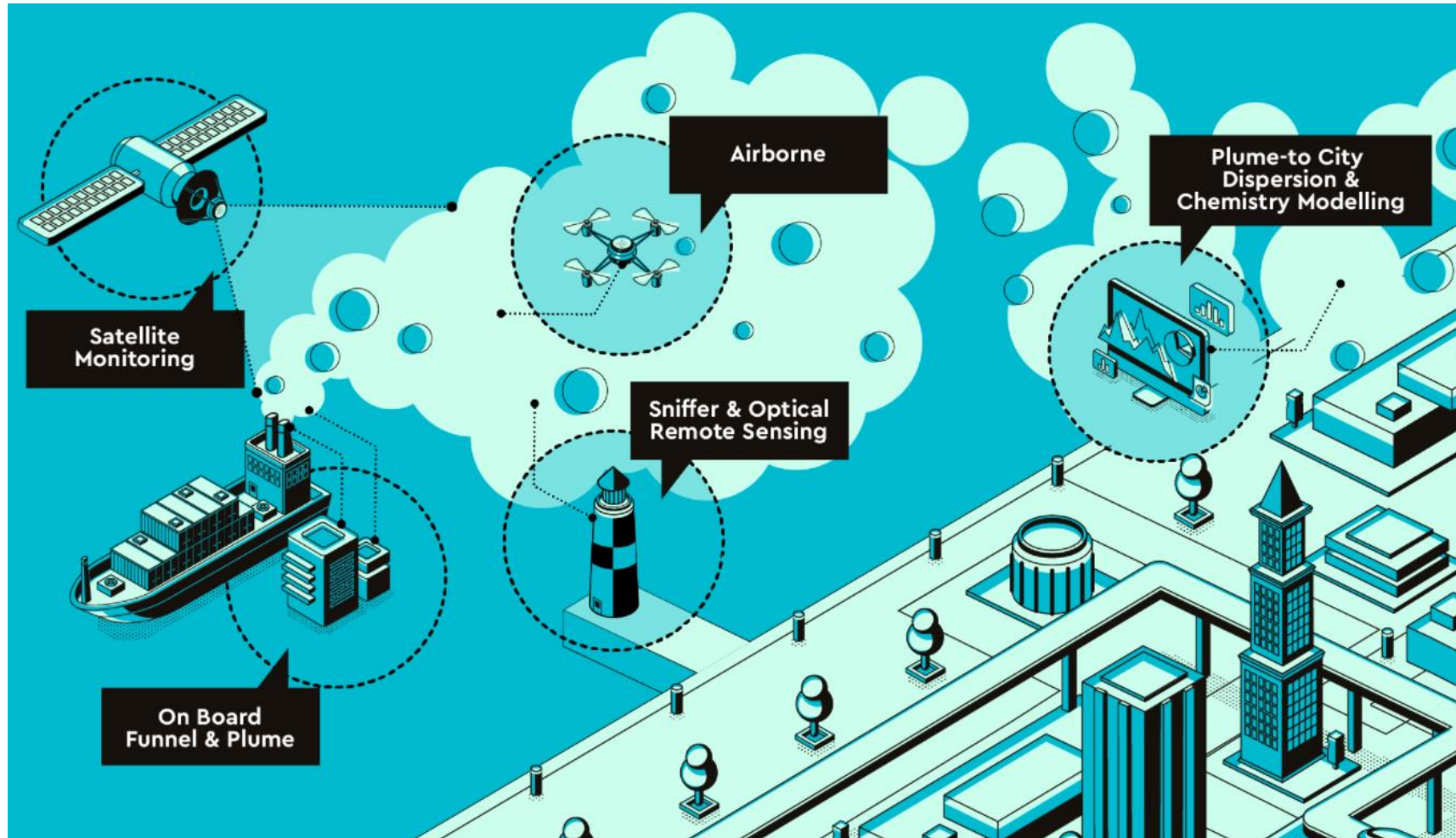
# Research Project EmissionSEA

## Calculation of CO2 Emissions from Ships, based on AIS and Ship Data



# Research Project SCIPPER

Shipping Contributions to Inland Pollution Push for the Enforcement of Regulation



# Thank you for your Attention!

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# Contact

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Fraunhofer CML

Am Schwarzenberg-Campus 4D

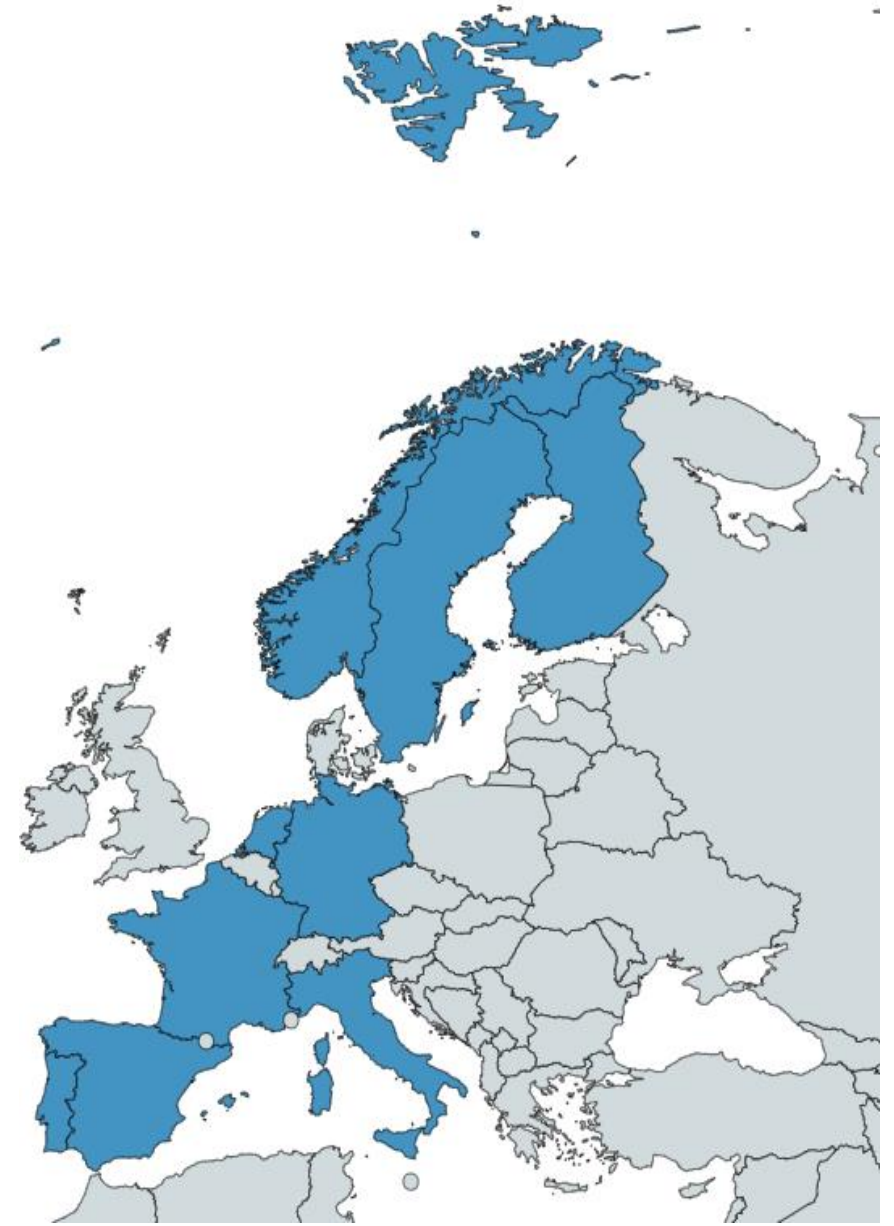
21073 Hamburg

[www.cml.fraunhofer.de](http://www.cml.fraunhofer.de)

# TALKING BLUE SUSTAINABILITY



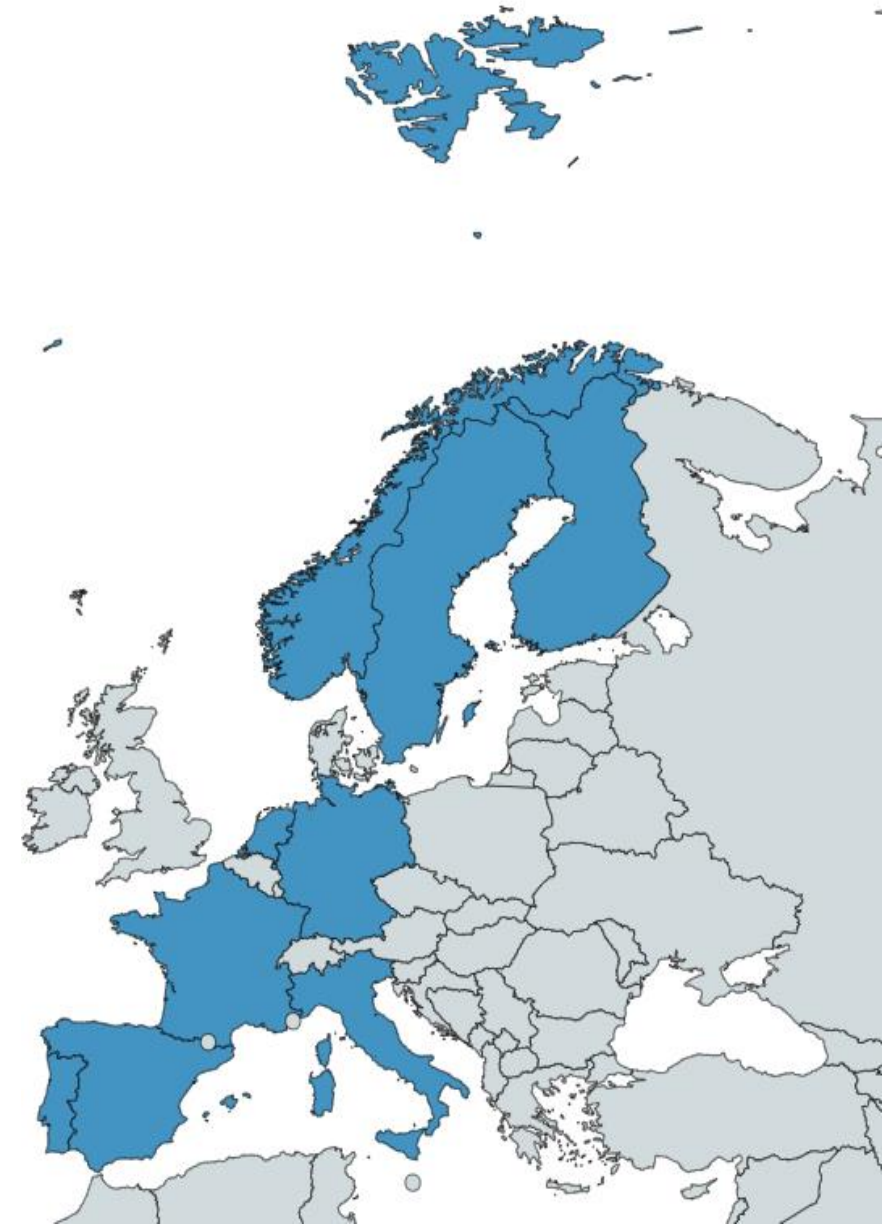
**Rasmus Andresen**  
Member of the European Parliament  
Patron of this webinar



# TALKING BLUE SUSTAINABILITY



**Nuno Loureiro**  
Head of Data Science and Development  
CoLAB +Atlantic





# Monitoring hyper-connected and complex ocean environments towards effective policy

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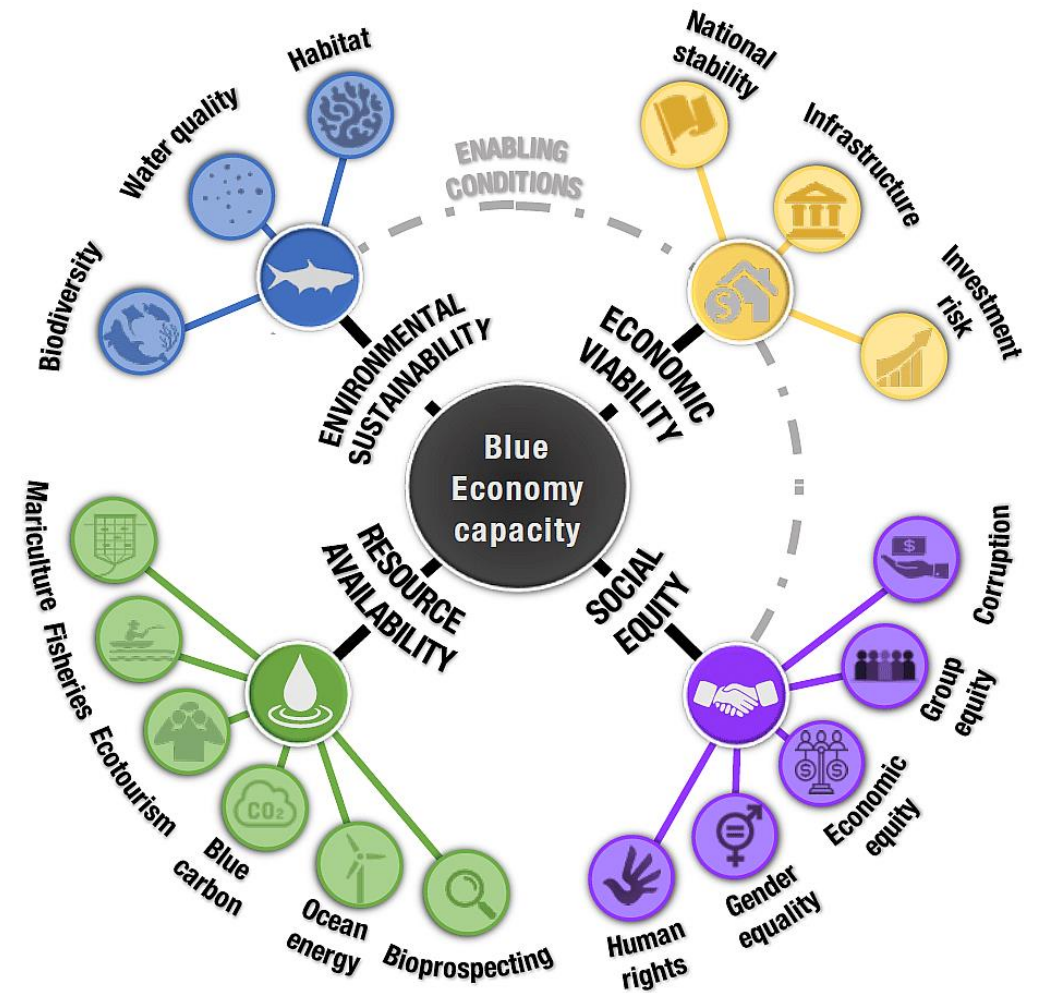
June 2022



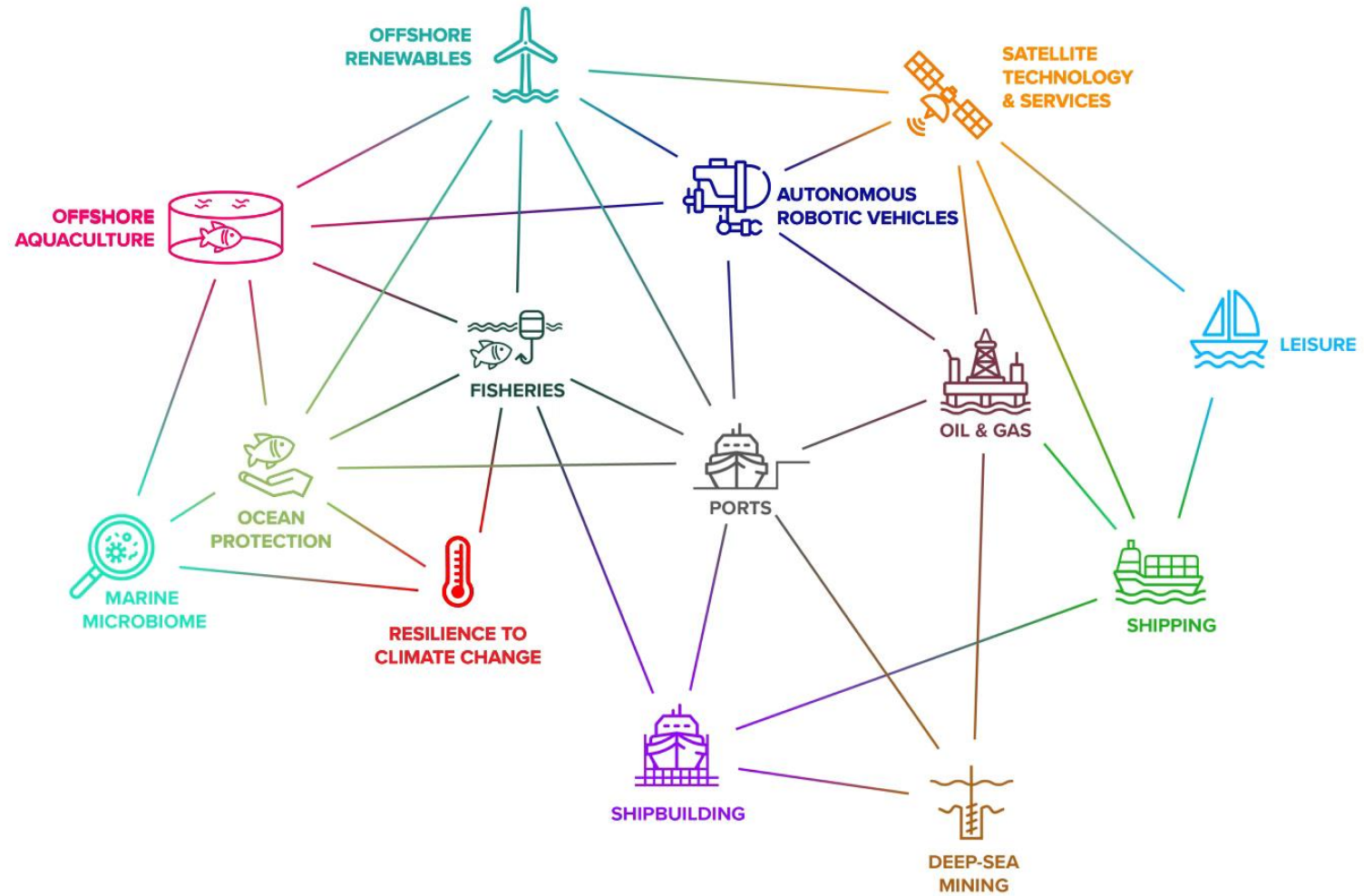
## Hyper-connectivity and data complexity

There is **great complexity** in the grand societal issues we have to overcome. In order to develop policy goals to address this issues we need a **systemic approach**:

1. combine & integrate different types of data
2. make sense of the data in terms of effects on wellbeing



# CoLAB +ATLANTIC

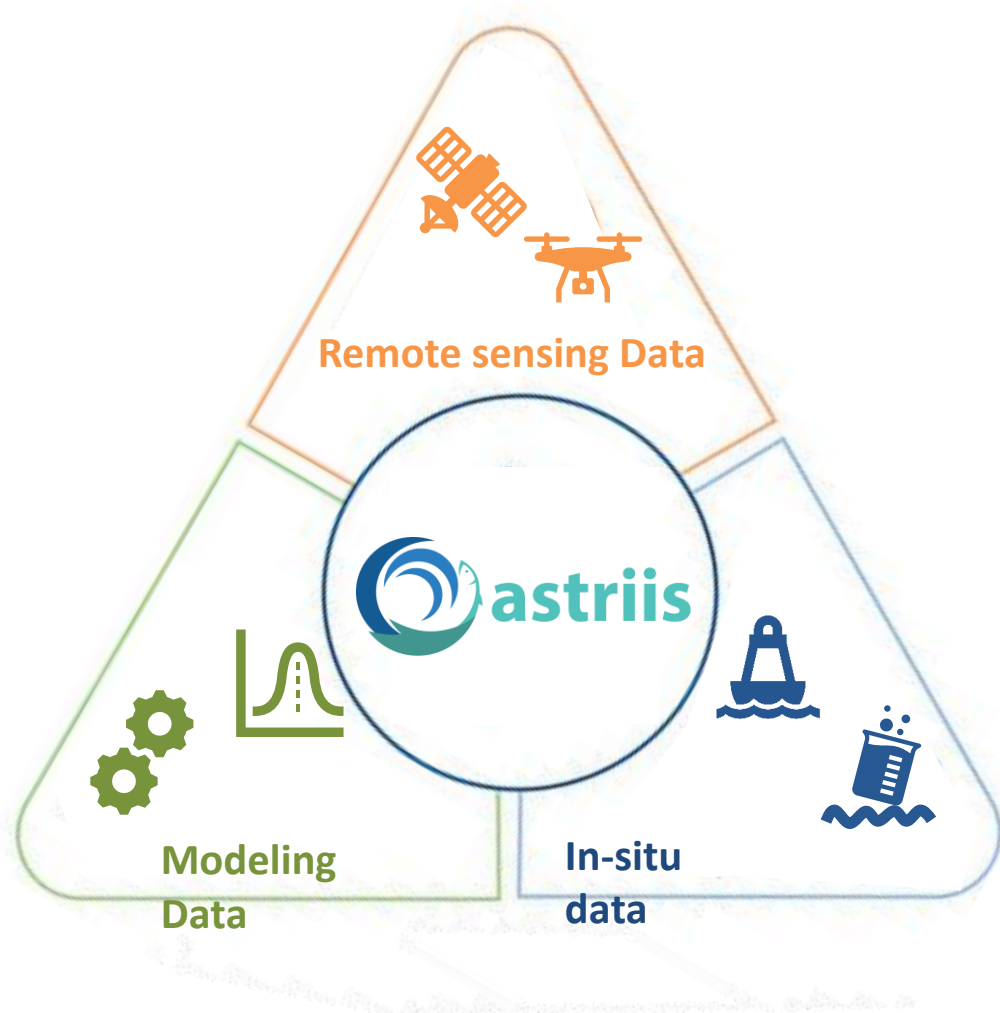


## + ASTRIS Digital Twin

A virtual representation of a system that is updated from **real-time data** and uses **simulation** to help **decision-making**

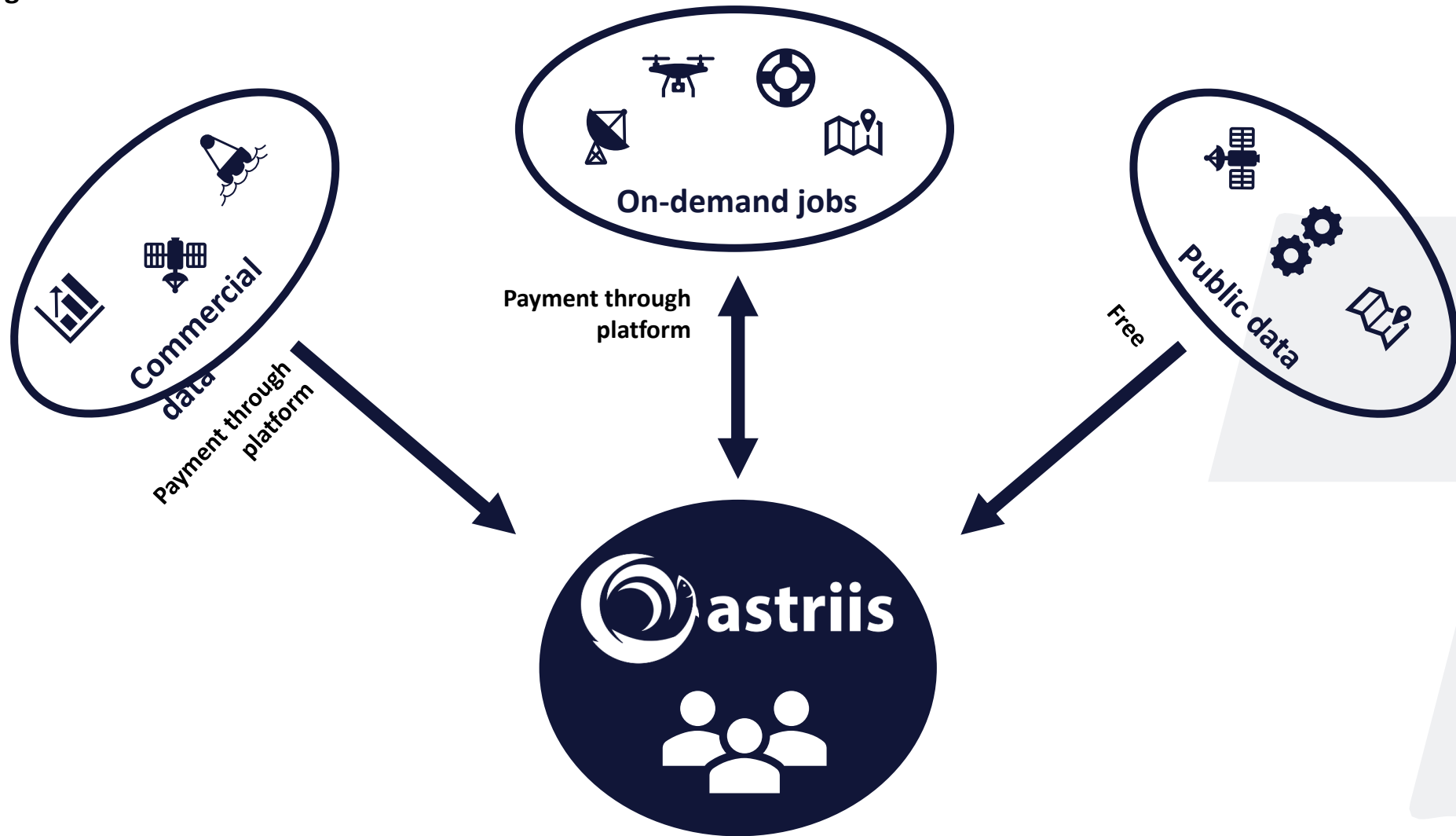


## + ASTRIS Digital Twin



- Integrative platform
- Combines many existing sources of data:
  - Remote sensing
  - In-situ Monitoring
  - Modelling Data
- If data does not exist allows for on-demand jobs

+ ASTRIIS Digital Twin



+ ASTRIS Digital Twin – example fields

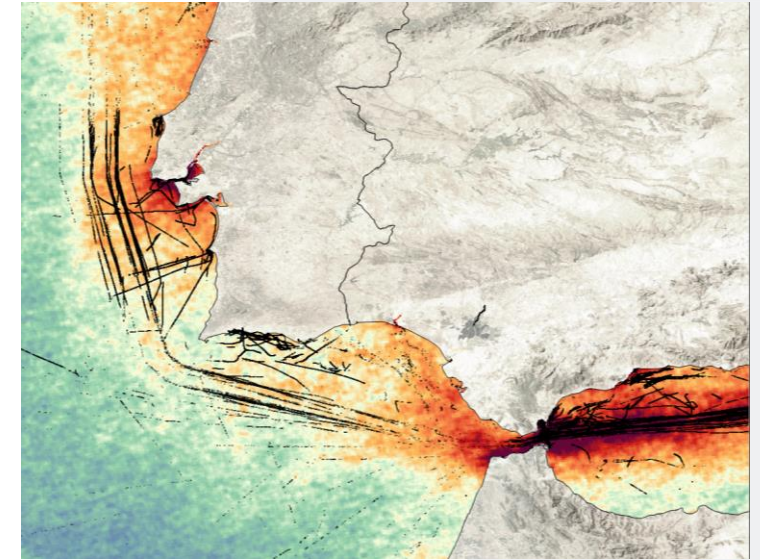
## Harmful Algal Blooms



## Search And Rescue



## Vessel pollution

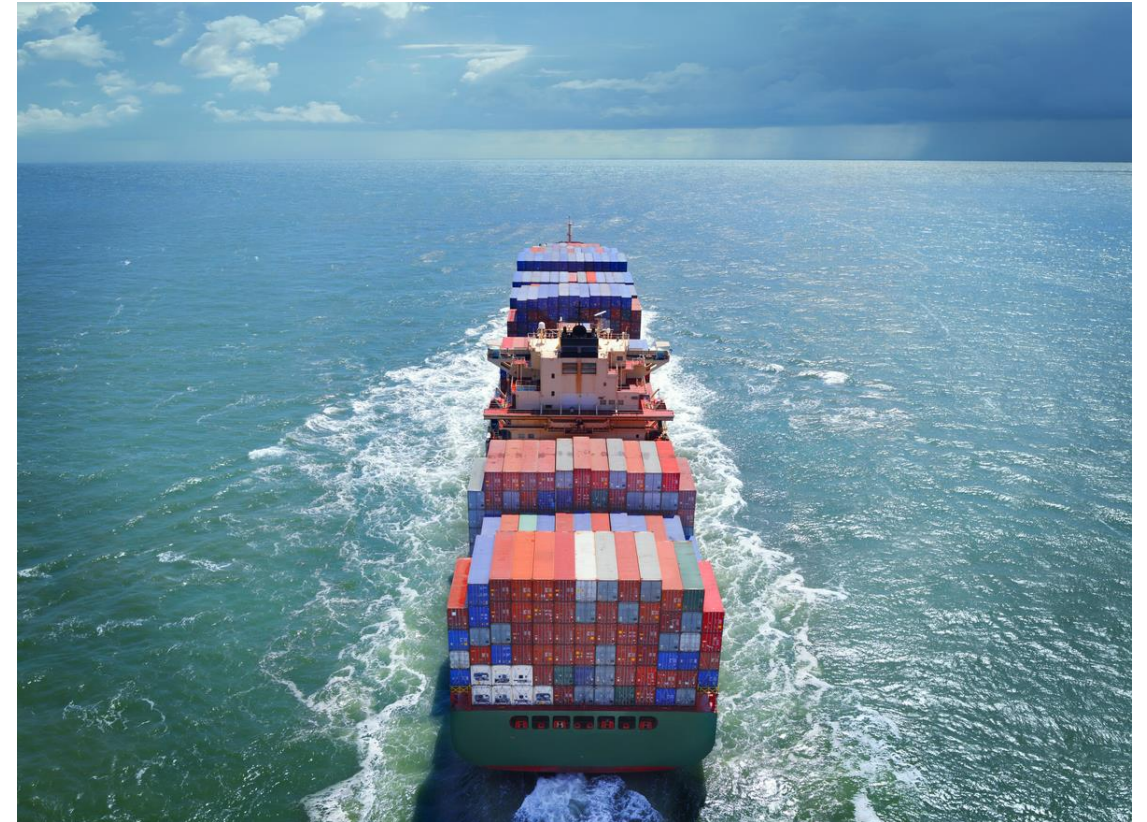


## Tracking vessel GHG emissions

**IMO** estimated total shipping emissions of **1M tonnes of CO<sub>2</sub>** in 2018 (~2.89% of emissions)



Proposed a **reduction of 30%** in carbon intensity **by 2025** for newbuild ships in its GHG Strategy





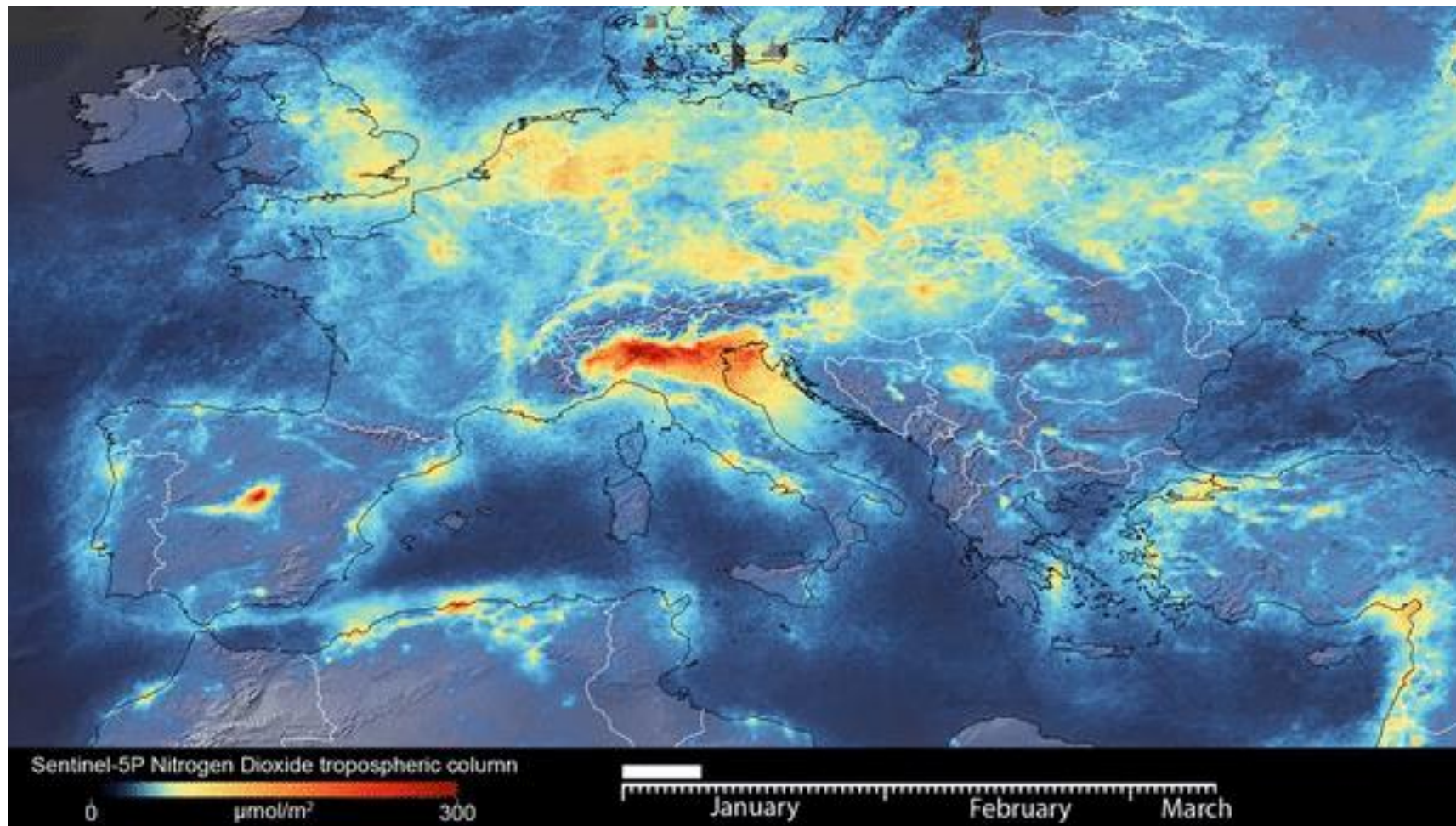
## Tracking vessel GHG emissions

! *CO<sub>2</sub> dissolves rapidly in the atmosphere*

*Vessels also emit NO<sub>2</sub>, a harmful pollutant that is easier to map from satellite data (plumes lifetime of 2-3h)*

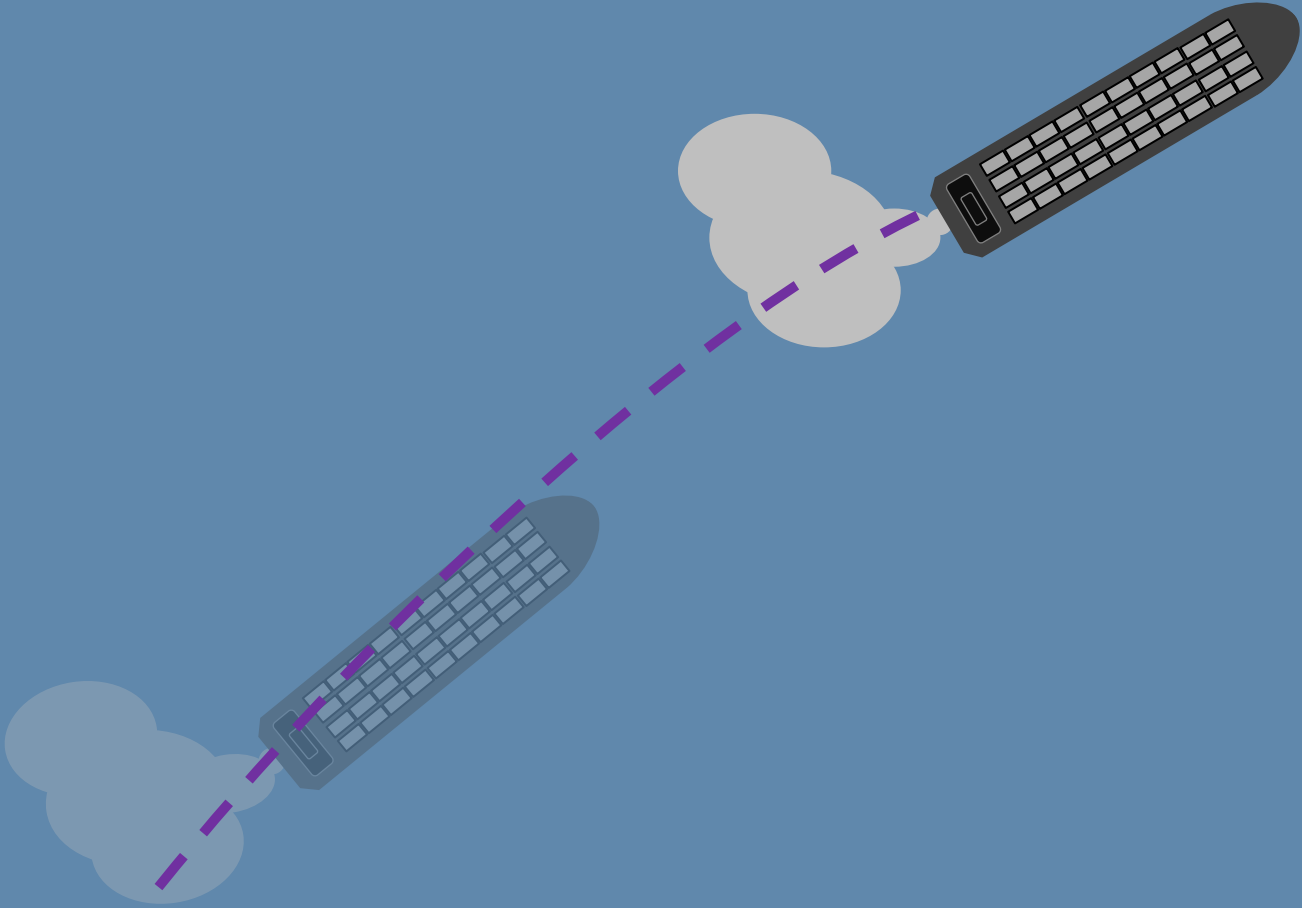
*Satellite-based trace gas mapping is currently envisaged as a complementary source of data, useful to compare with the emissions reported*



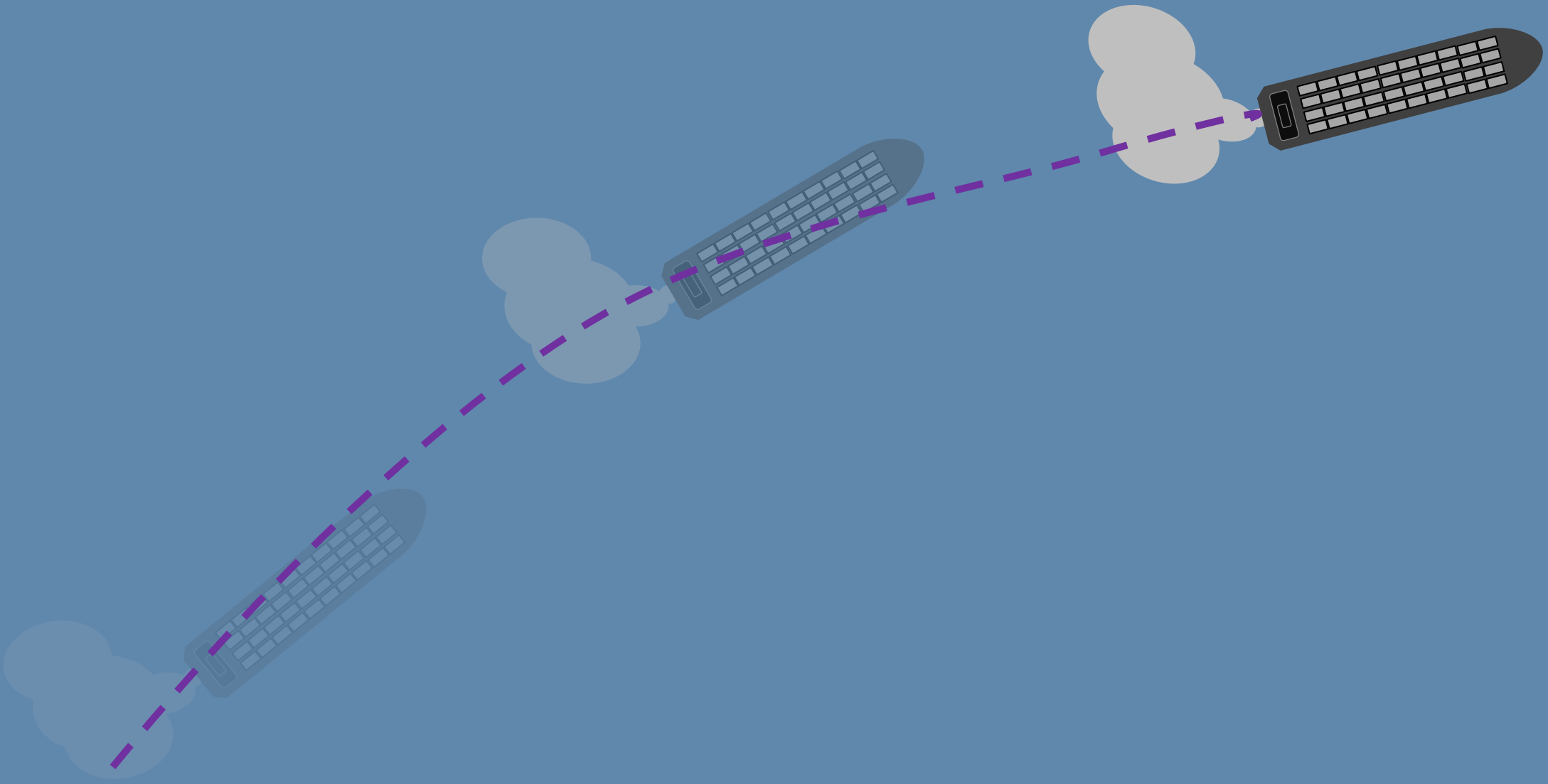




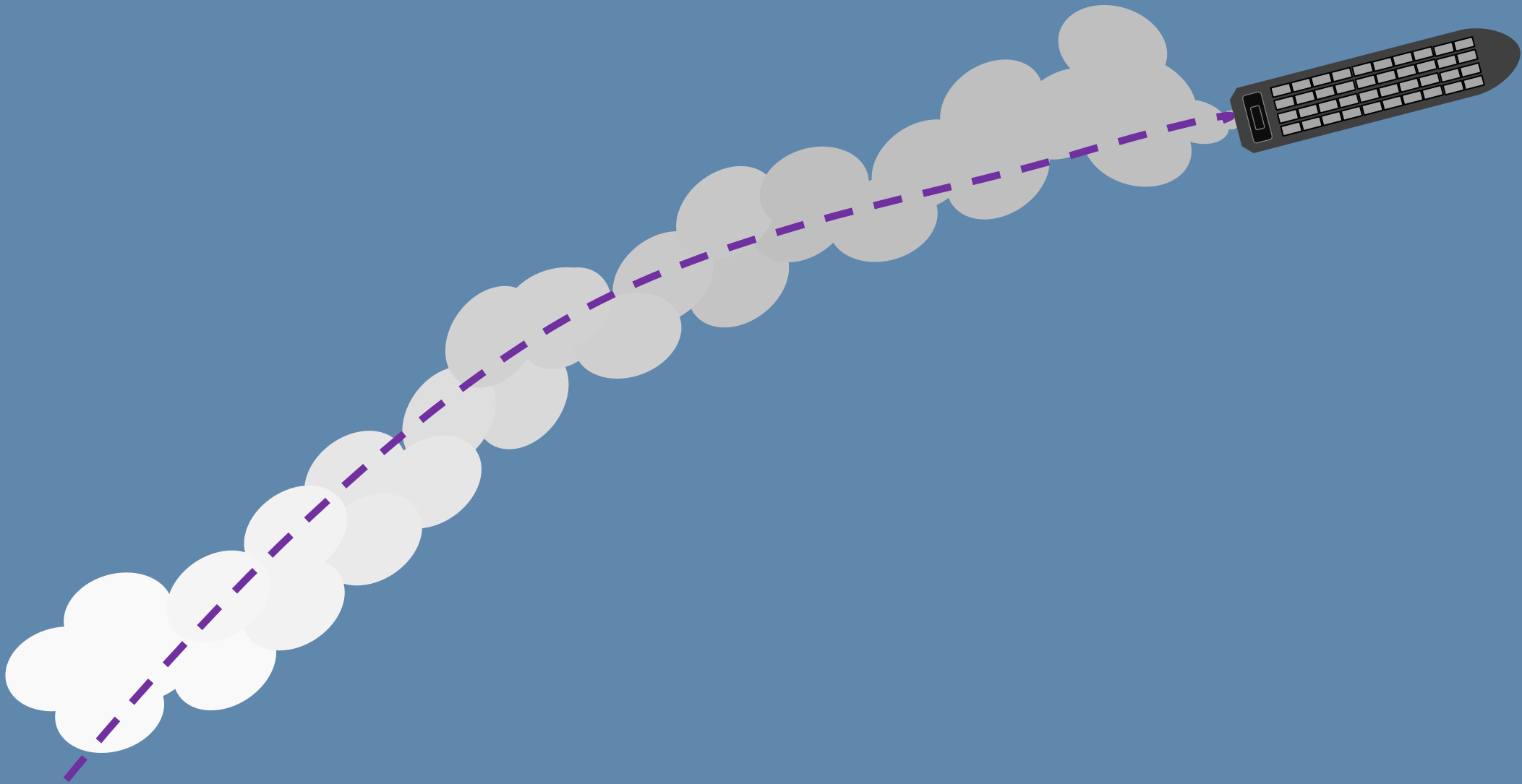
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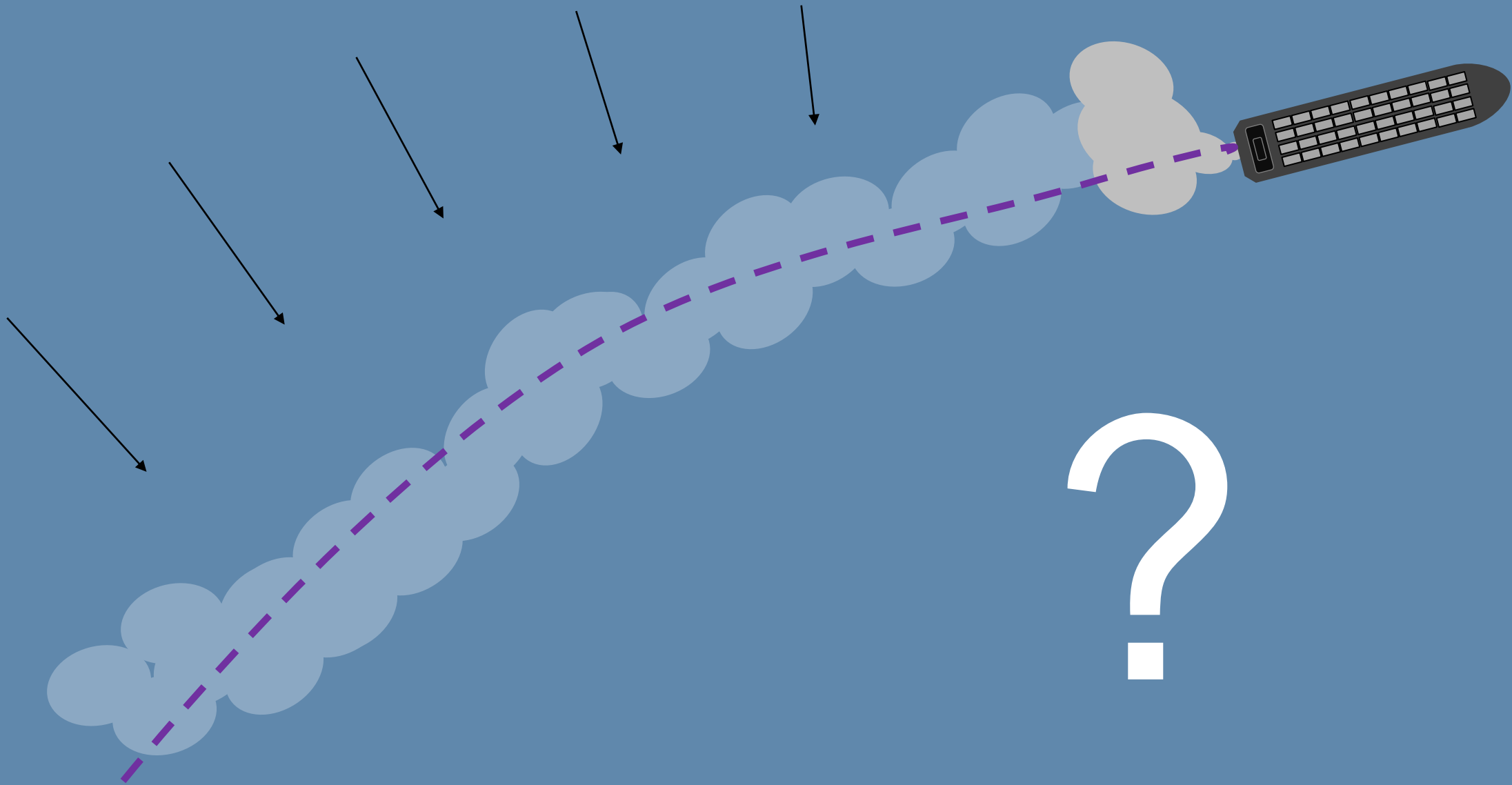
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12:00

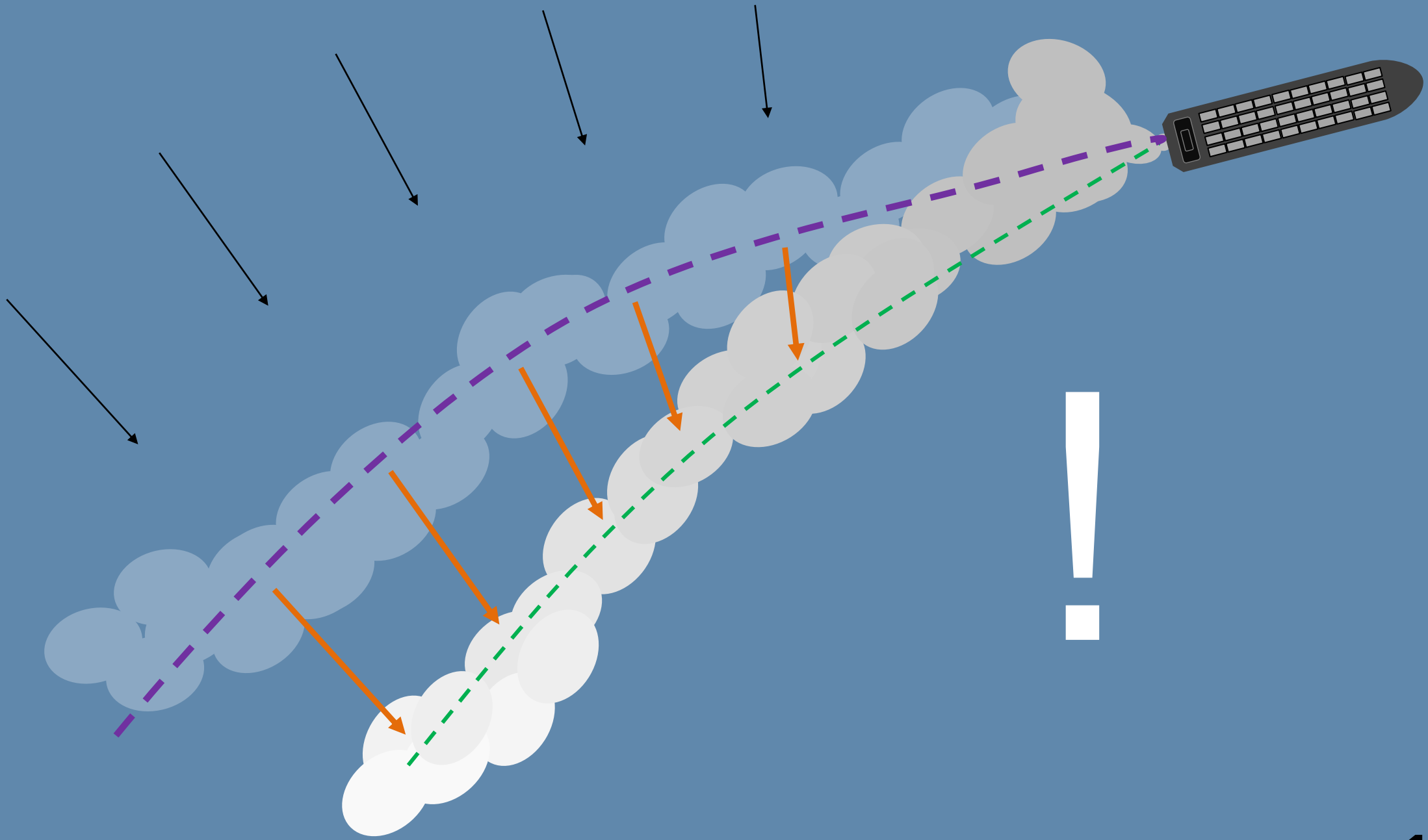


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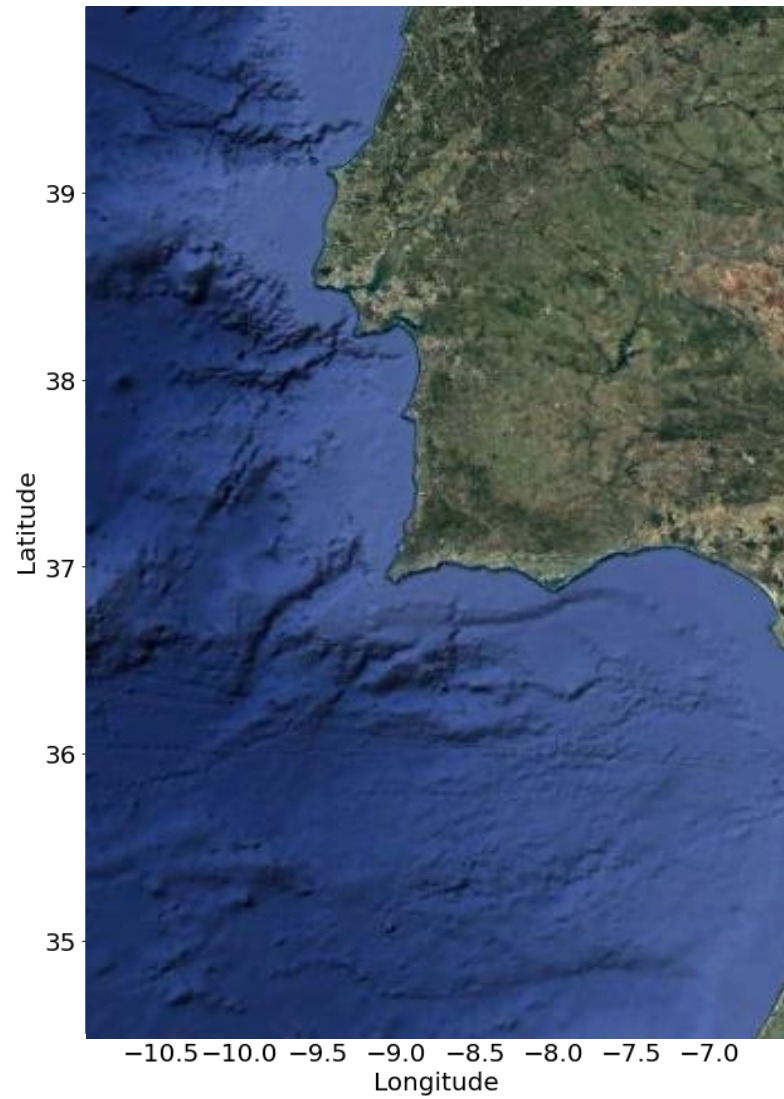
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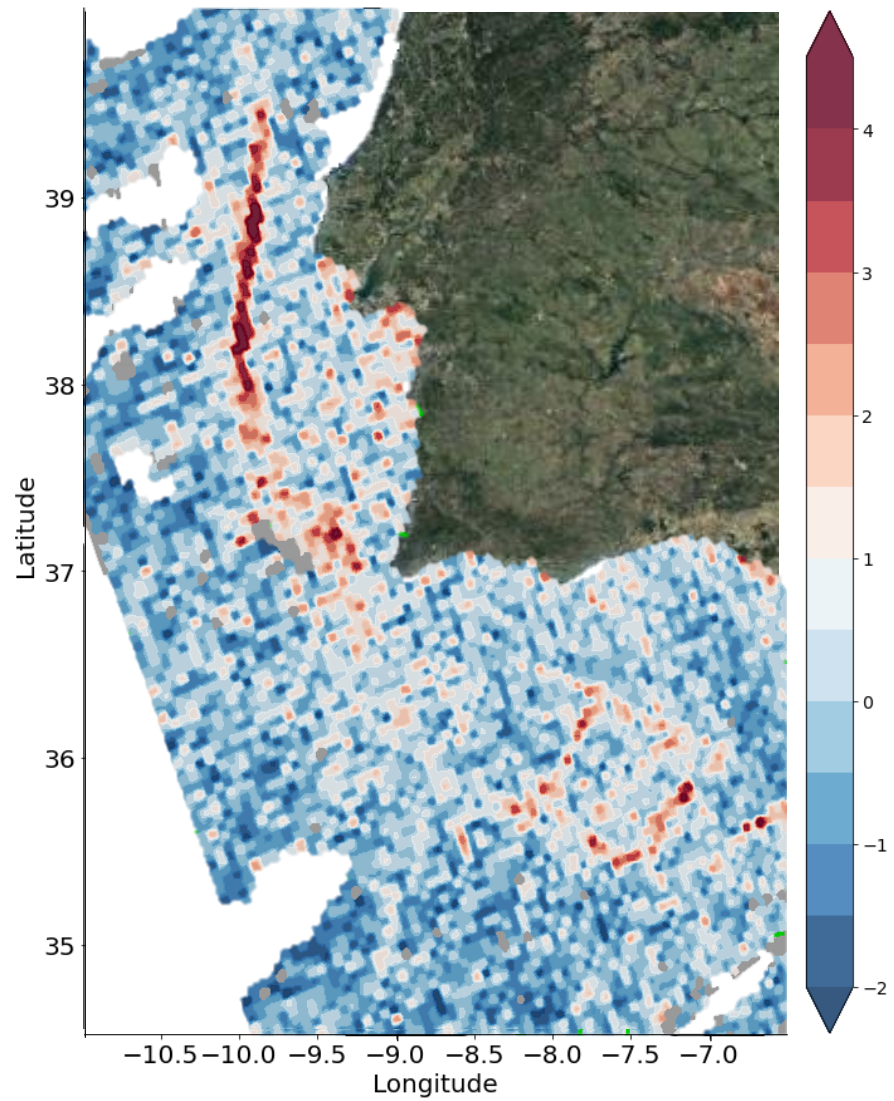
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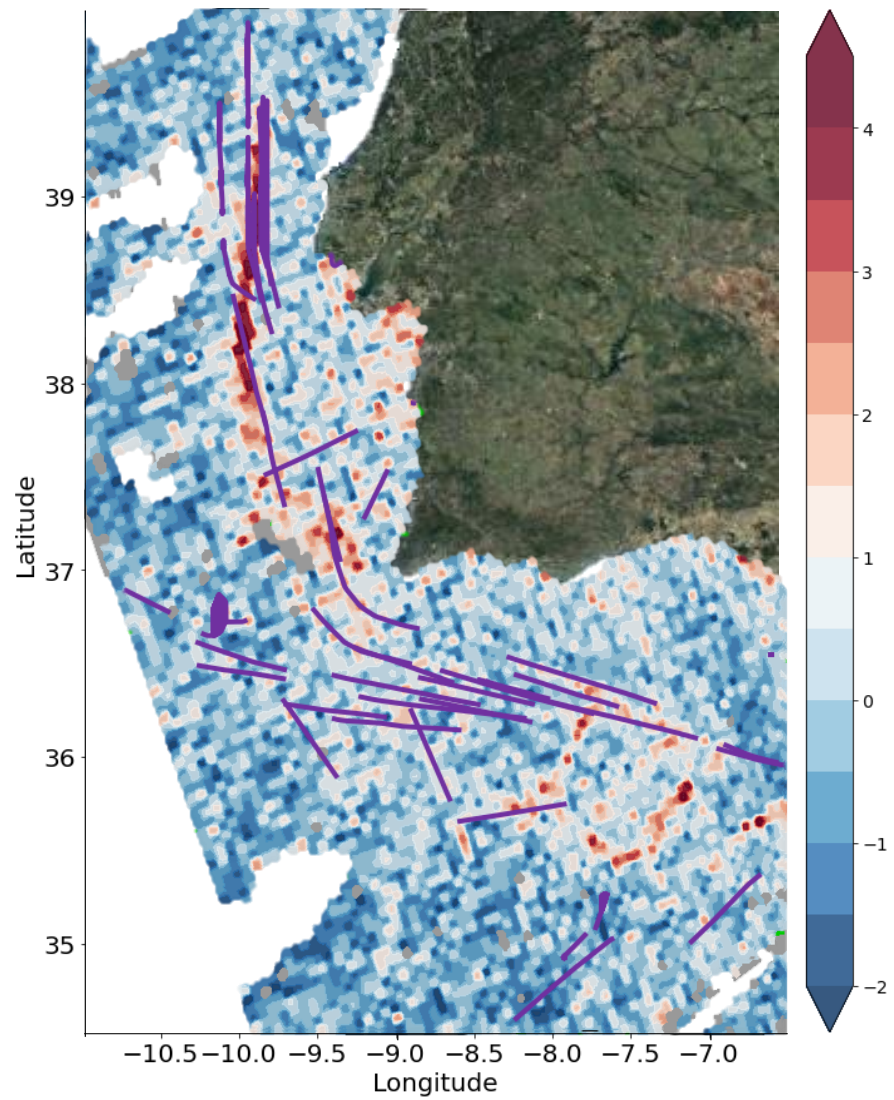
**Point in case: NO<sub>2</sub> vessel emission on the 7<sup>th</sup> July 2020**



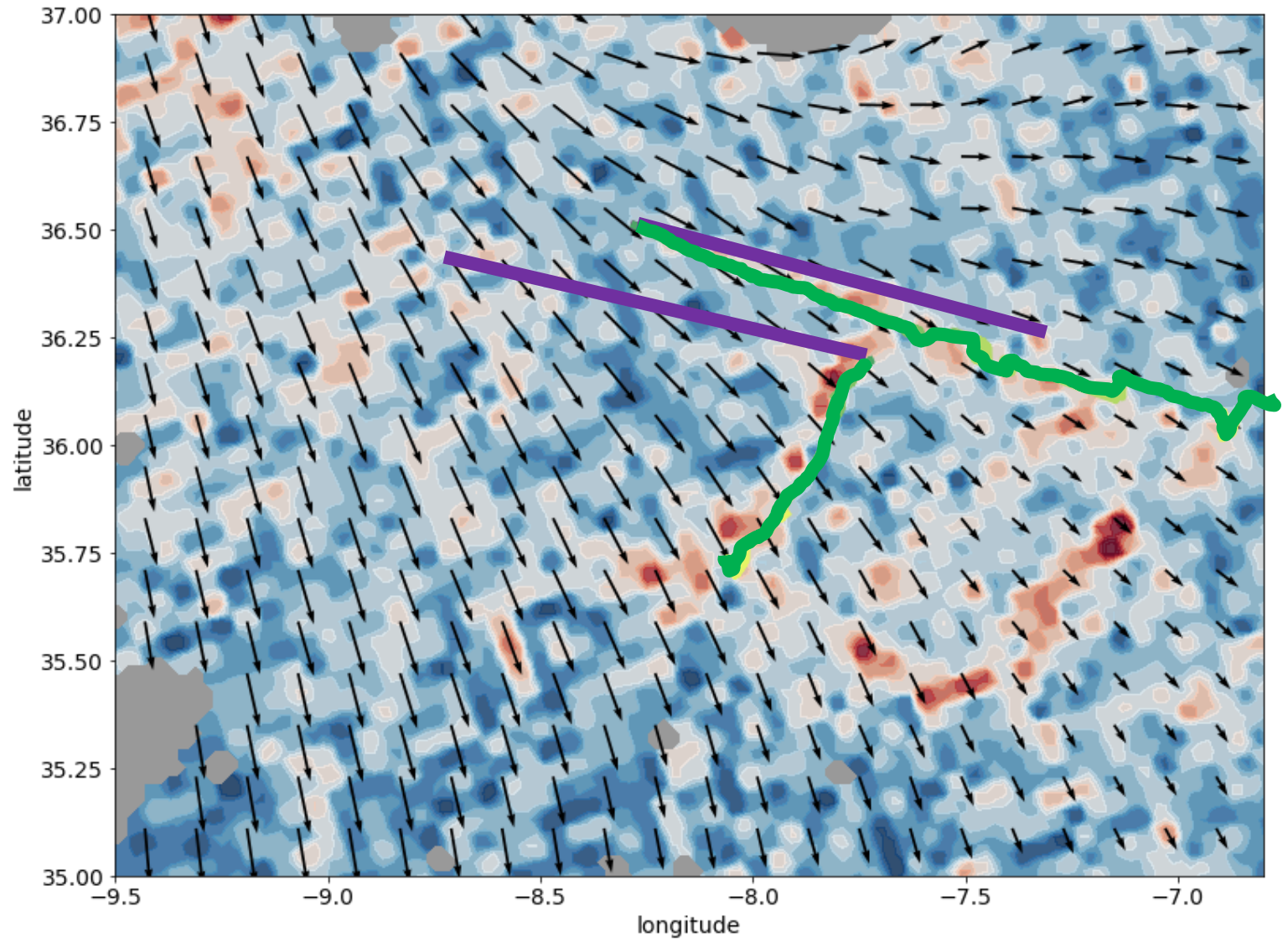
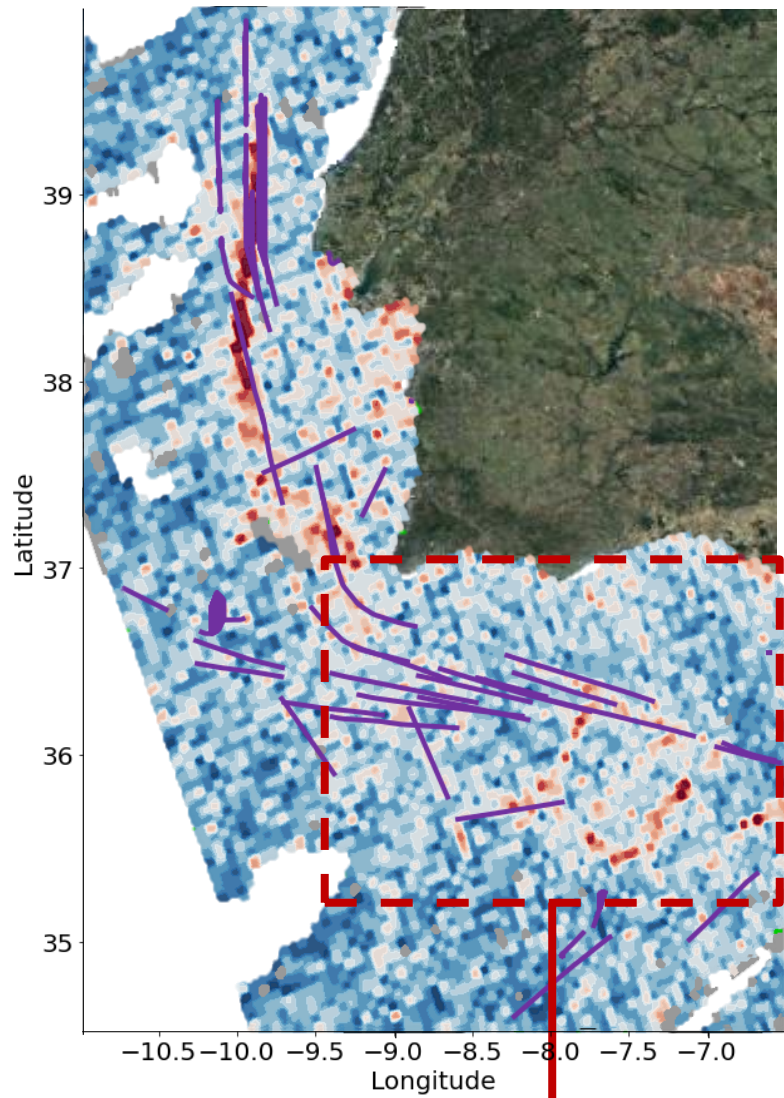
Point in case: NO<sub>2</sub> vessel emission on the 7<sup>th</sup> July 2020



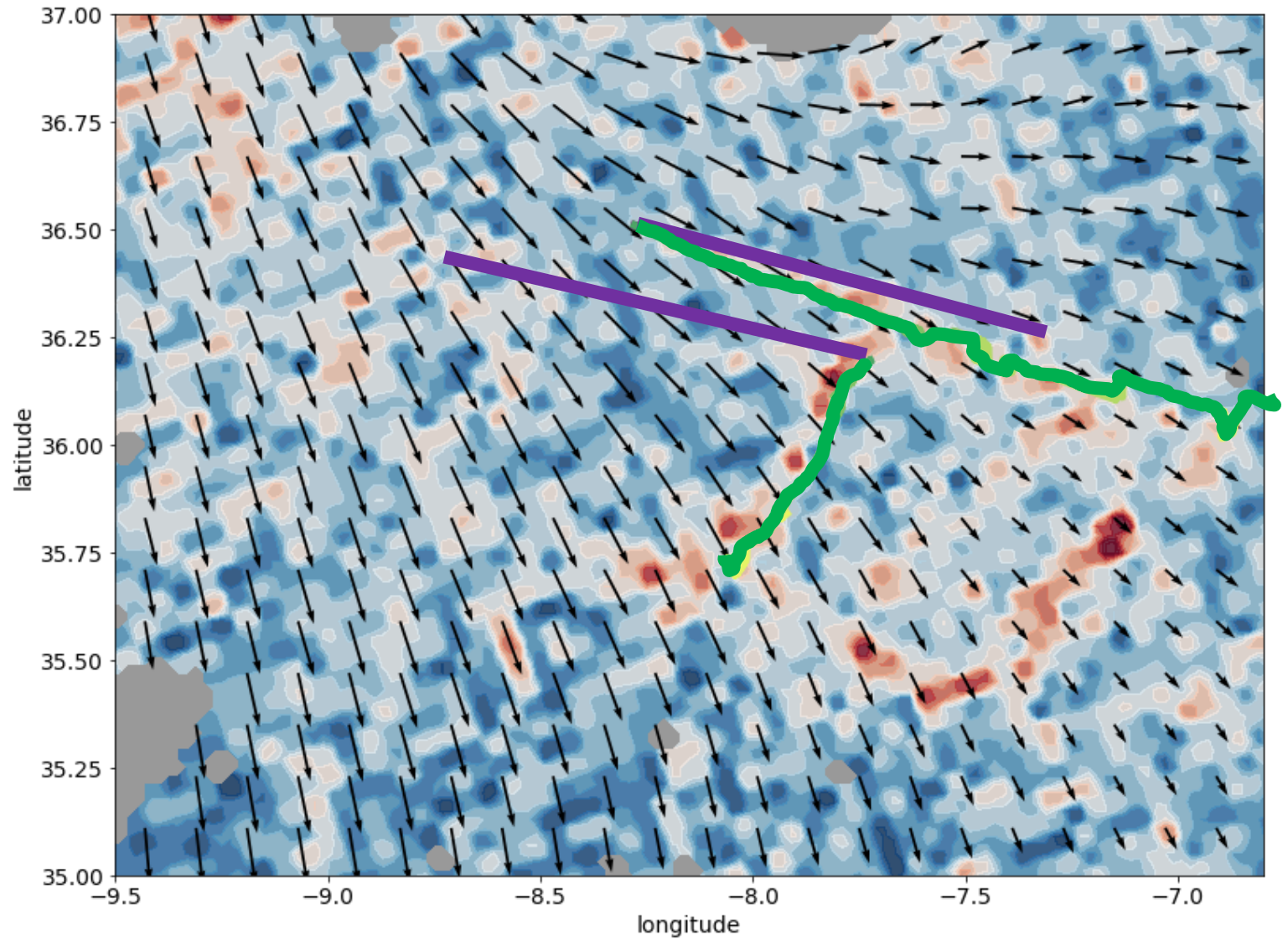
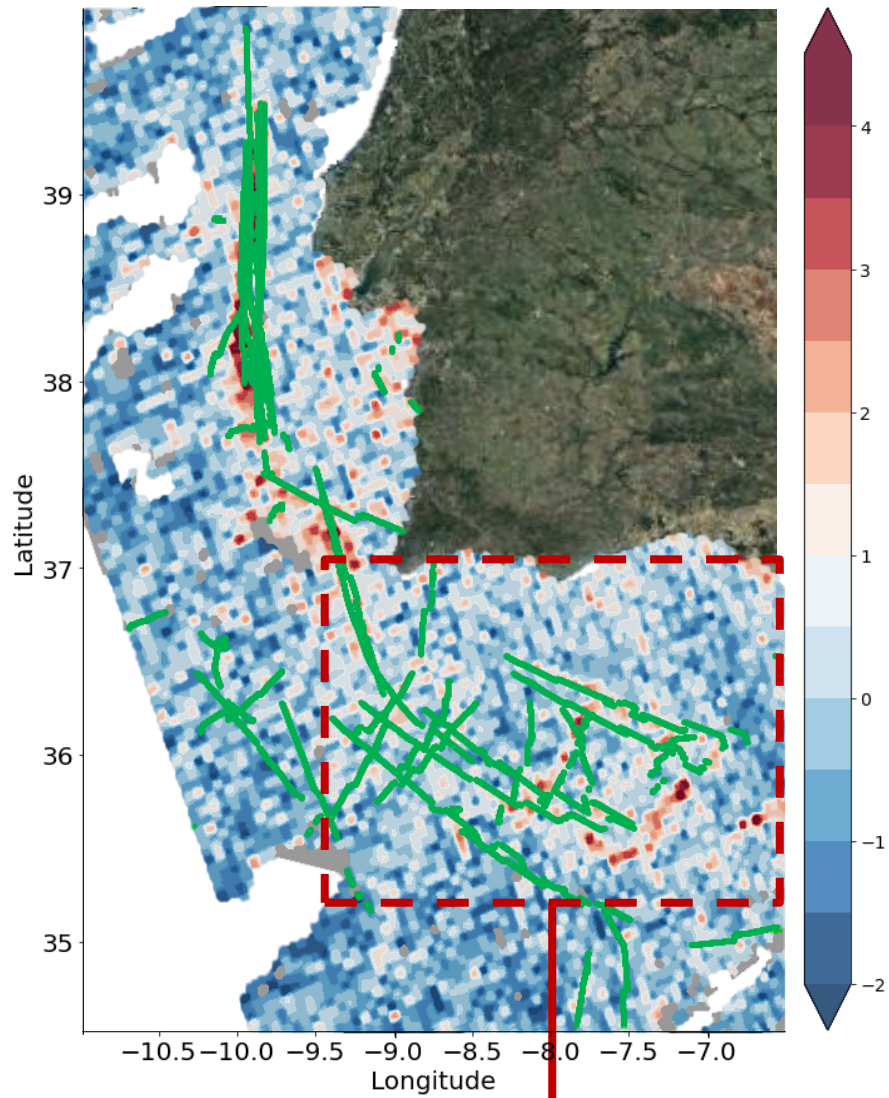
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Point in case: NO<sub>2</sub> vessel emission on the 7<sup>th</sup> July 2020



Point in case: NO<sub>2</sub> vessel emission on the 7<sup>th</sup> July 2020



# Only the integration of different sources can provide an accurate representation of the system



**Thank you**



CoLAB  
**+ATLANTIC**

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**+ATLANTIC CENTRO**

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**+ATLANTIC NORTE**

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Matosinhos, Portugal

**+ATLANTIC LVT**

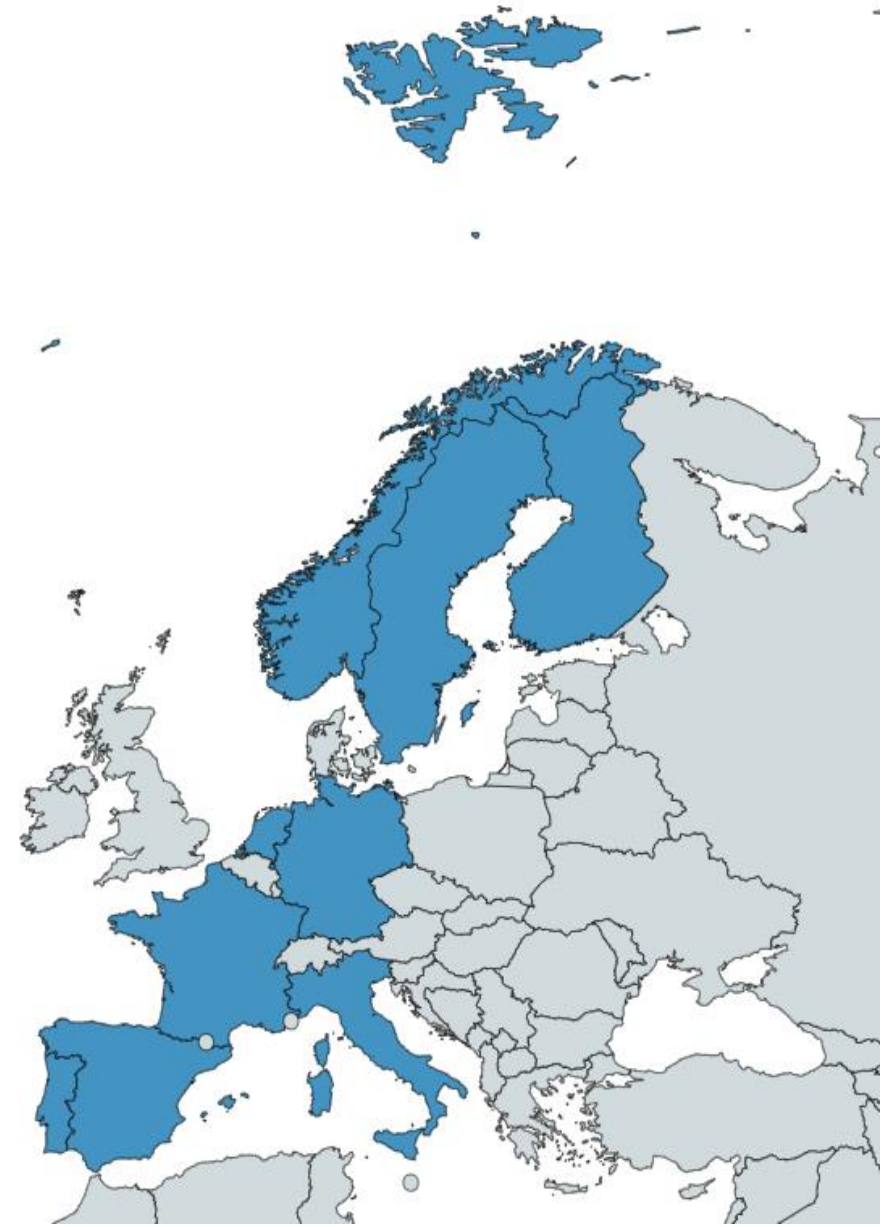
Edifício LACS  
Estrada da Malveira da Serra  
920 2750-834  
Cascais, Portugal

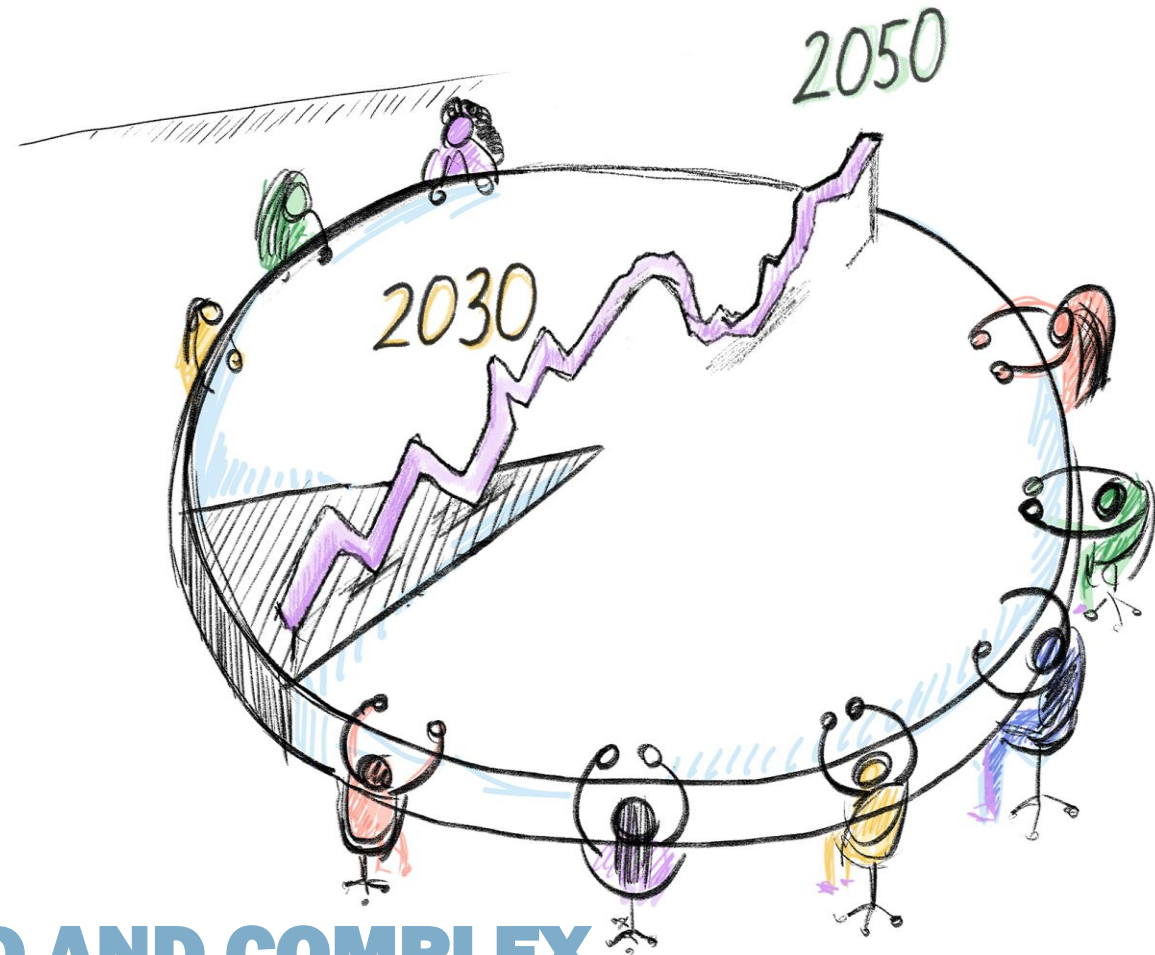


# TALKING BLUE SUSTAINABILITY



**Josephine Sassen**  
Senior Integrating Scientist  
TNO





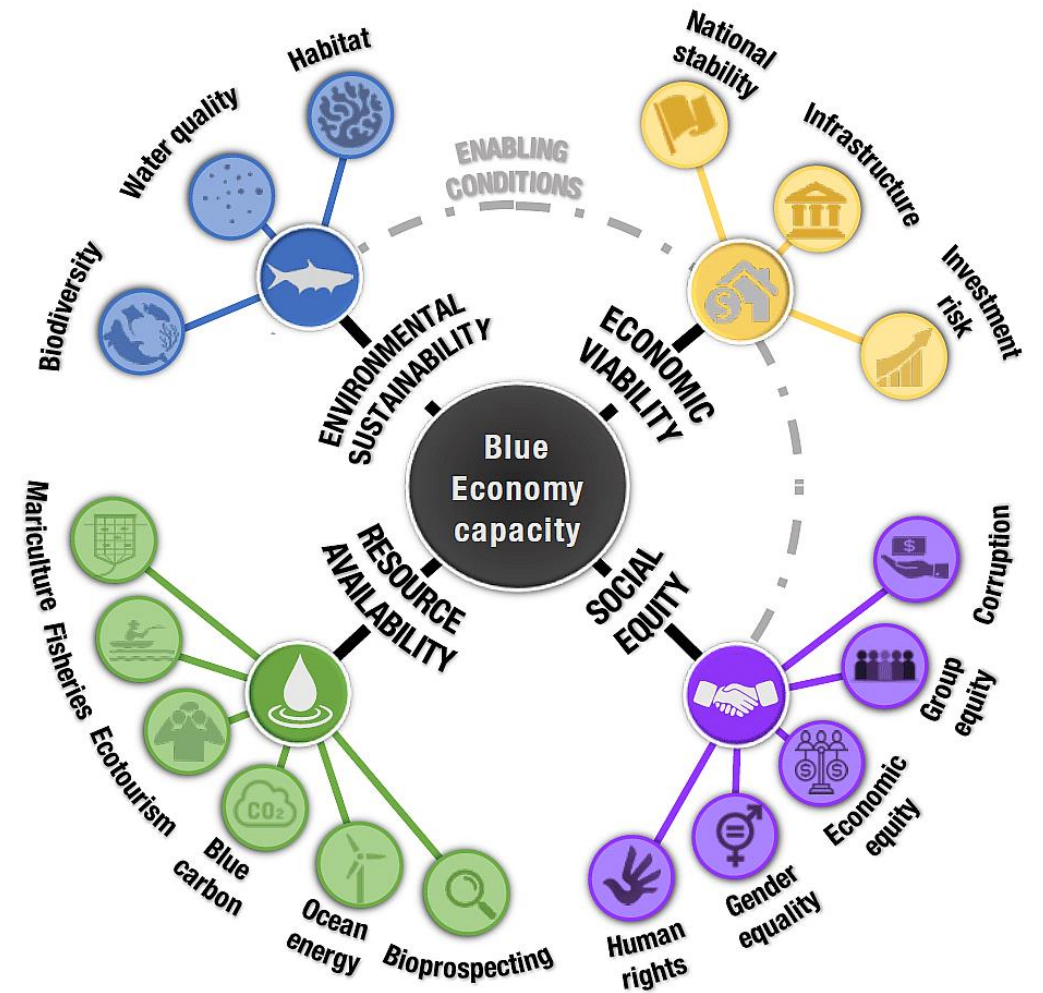
**MONITORING HYPER-CONNECTED AND COMPLEX  
OCEAN ENVIRONMENTS  
TOWARDS EFFECTIVE POLICY**

**JOSEPHINE SASSEN**

## Hyper-connectivity and data complexity

There is **great complexity** in the grand societal issues we have to overcome. In order to develop policy goals to address this issues we need a **systemic approach**:

1. combine & integrate different types of data
2. make sense of the data in terms of effects on wellbeing



# MODERN POLICY FOCUSSES ON WELLBEING



## Raising living standards for all New Zealanders

NZ Treasury's Living Standards Framework



THE TREASURY  
Kaitiaki Take Kōwhiri

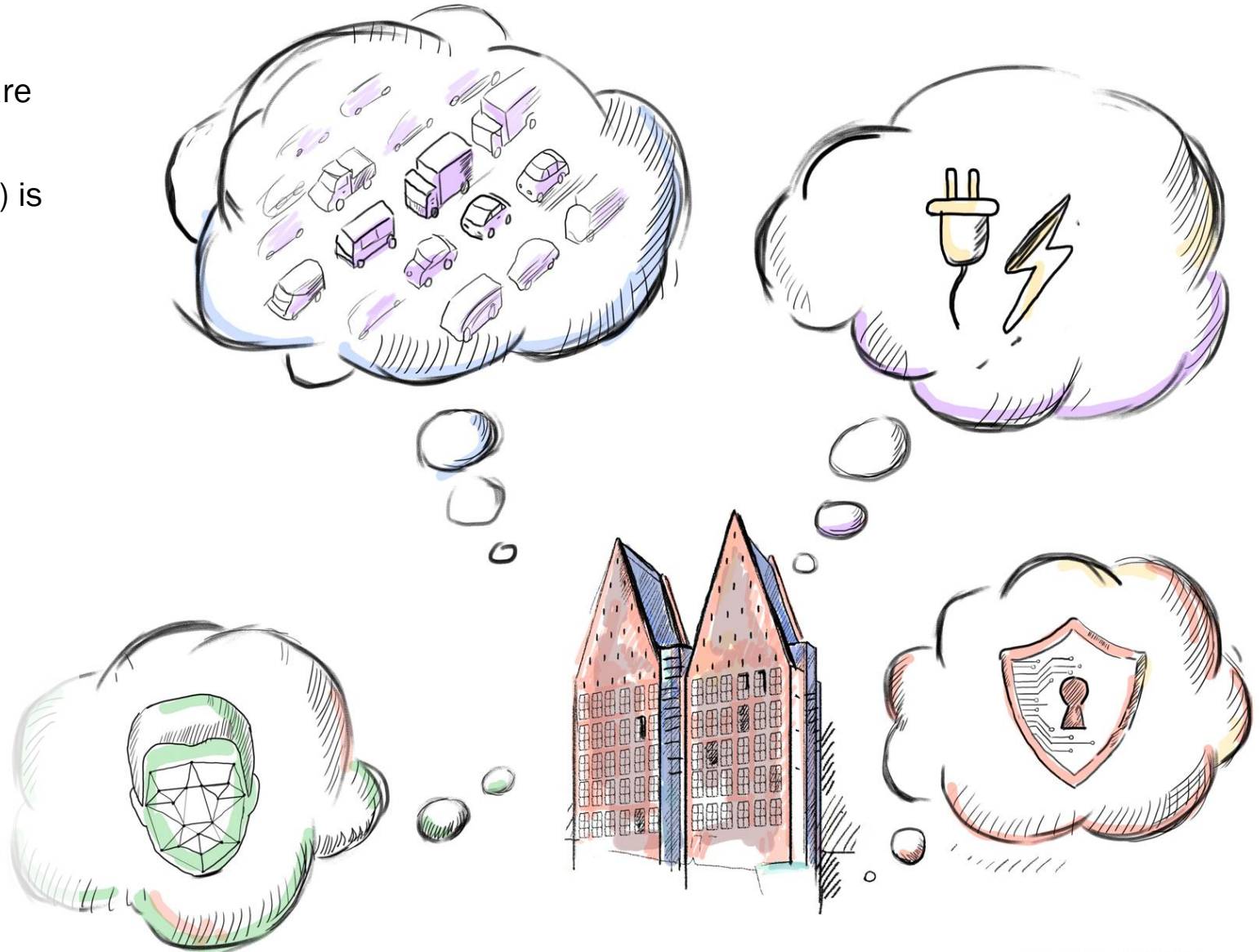


# CHALLENGES IN STEERING TOWARDS WELLBEING

- Complex societal & environmental issues are difficult to express or compare in €
- Estimating the effects beforehand (ex ante) is even more complex than estimating them afterwards

*More so if you want to take into account the complexity of...*

- Mutual interaction effects
- Secondary and tertiary effects
- Different effects in wellbeing (apples and oranges)
- Differentiation between target groups (e.g. elderly versus youth)
- Effects here versus elsewhere
- Effects now versus later



## › TNO RESEARCH: WISE POLICY

We are developing tooling\* that will enable the following:

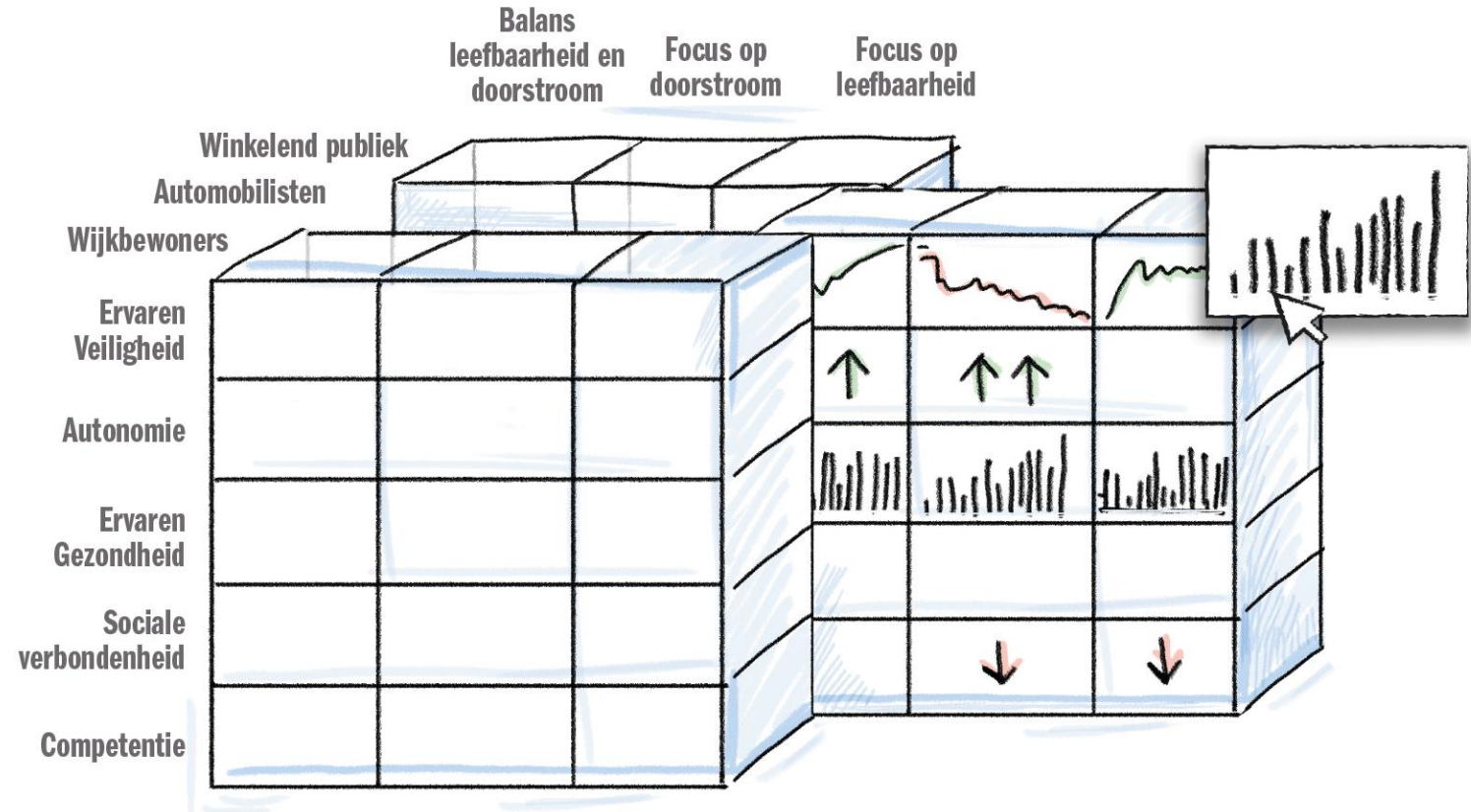
- › Parameters of well-being are more mutually comparable (apples and oranges)
- › Make a clear distinction between "Means" and "Ends"
- › Differentiate between target groups
- › Combining quantitative and qualitative data
- › Identifying the complexity of mutual interactions
- › Incorporating effects on well-being “now & later” and “here & elsewhere”

\*We see this as research that will require many years of further development and may never be 'finished' because it can always be improved and refined as society evolves

# WISE POLICY SUITE

## WISE CUBE

- › Interactive dashboard
- › Insight into the effects of a measure on aspects of well-being
- › Breakdown by population group
- › Compare policy measures with each other
- › Complexity is under the hood: dashboard is handy and clear
- › It is always possible to retrace how the estimate of these effects was arrived at



# › HOW WOULD THIS WORK FOR NO2 EMISSIONS IN SHIPPING? A SYSTEMIC VIEW ON THE EFFECTS ON WELLBEING







- START
ALL
SHORT
MEDIUM
**LONG**

### Target groups

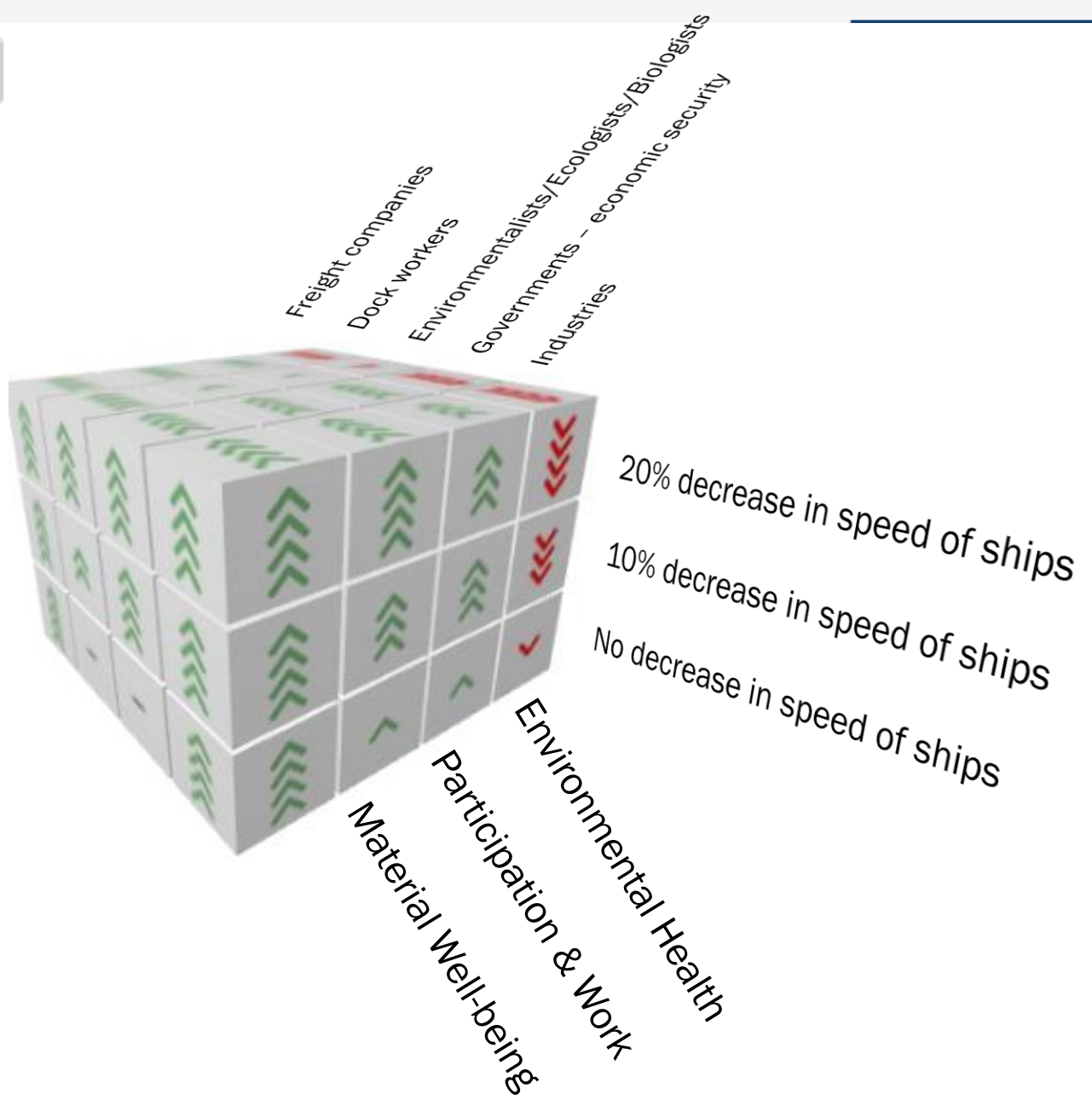
- Freight companies
- Environmentalists/Ecologists/Biologists
- Governments – Security, Safety & Resilience
- Dock workers

### Policy options

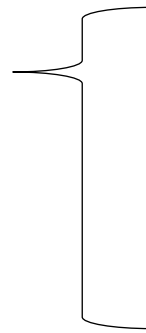
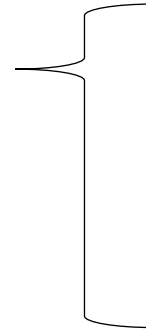
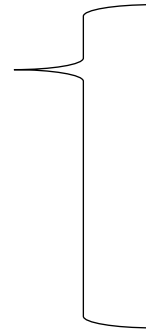
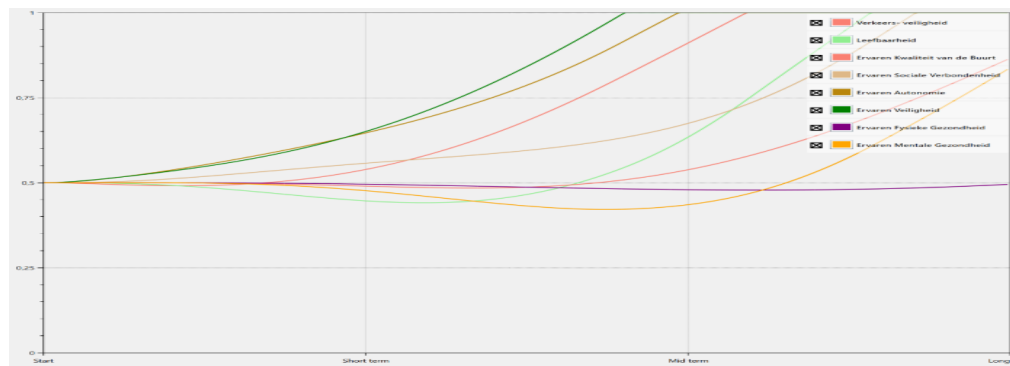
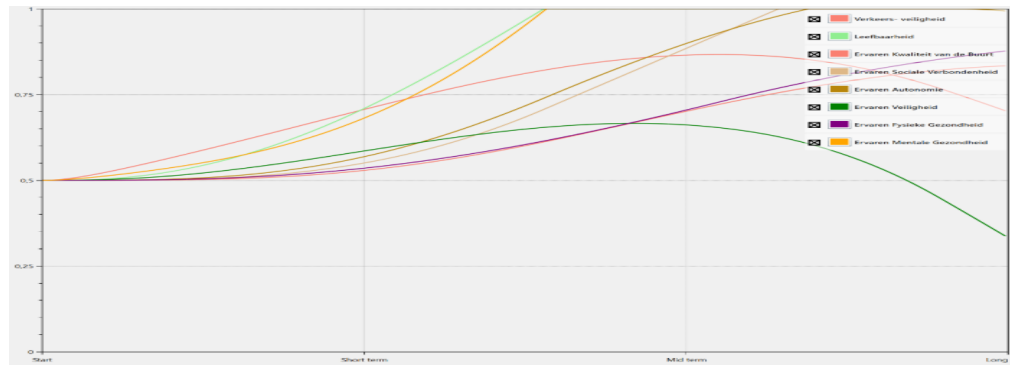
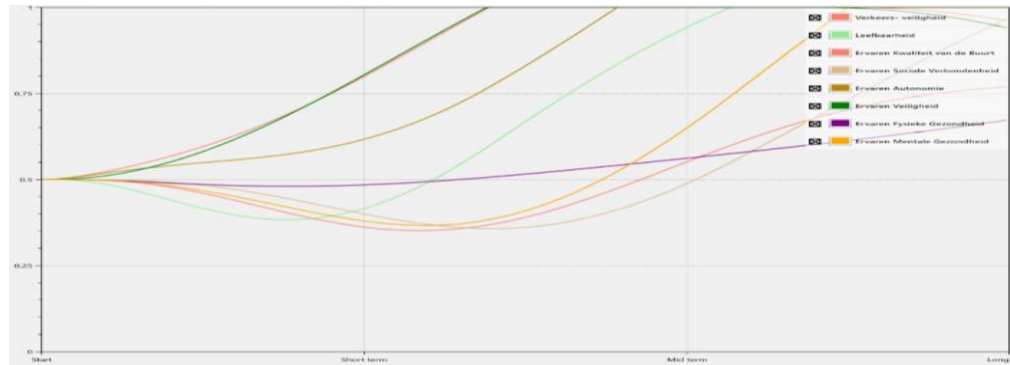
- 20% decrease in speed
- 10% decrease in speed
- No decrease in speed
- 

### Wellbeing parameters

- Environmental Health
- Participation & Work
- Material Well-being



# NOW AND LATER



# › A MODERN POLICY CYCLE

- › No “one-size-fits-all” answers
- › Balancing the interests of different population groups still remains
- › However...it does make it possible to make a much better informed choice – balancing quantitative measures with qualitative observation
- › The Wise Policy Suite thus contributes to a modern policy cycle that is more focused on increasing societal well-being



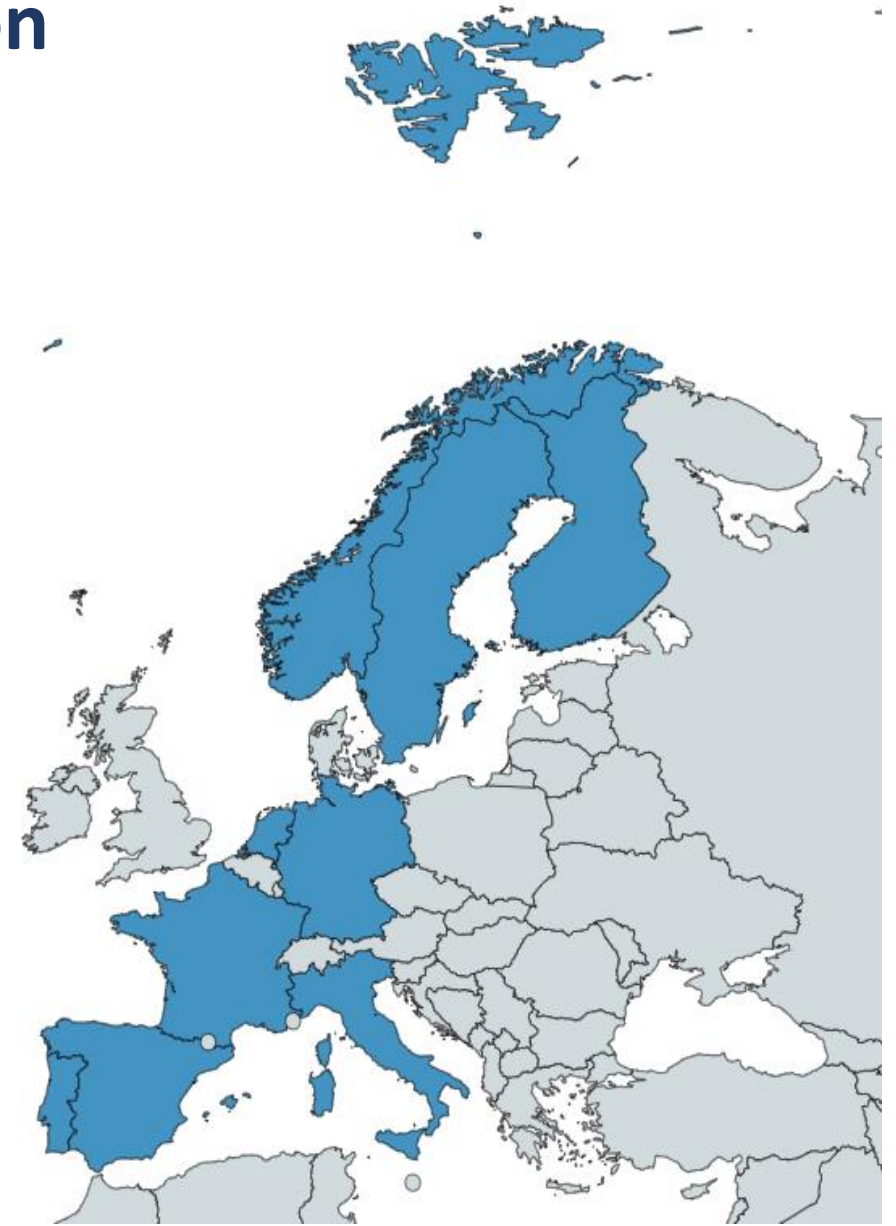
## › FIND OUT MORE?

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[Eric.Engelbrecht@tno.nl](mailto:Eric.Engelbrecht@tno.nl)



# TALKING BLUE SUSTAINABILITY: Discussion



# Thank you for your attention!



For more information:

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Website: [Innovation Platform Sustainable Sea and Ocean Solutions ISSS](#)

