Genavir's carbon footprint and ways of achieving a 30% reduction with an ageing fleet.

Everything that can be measured can be changed

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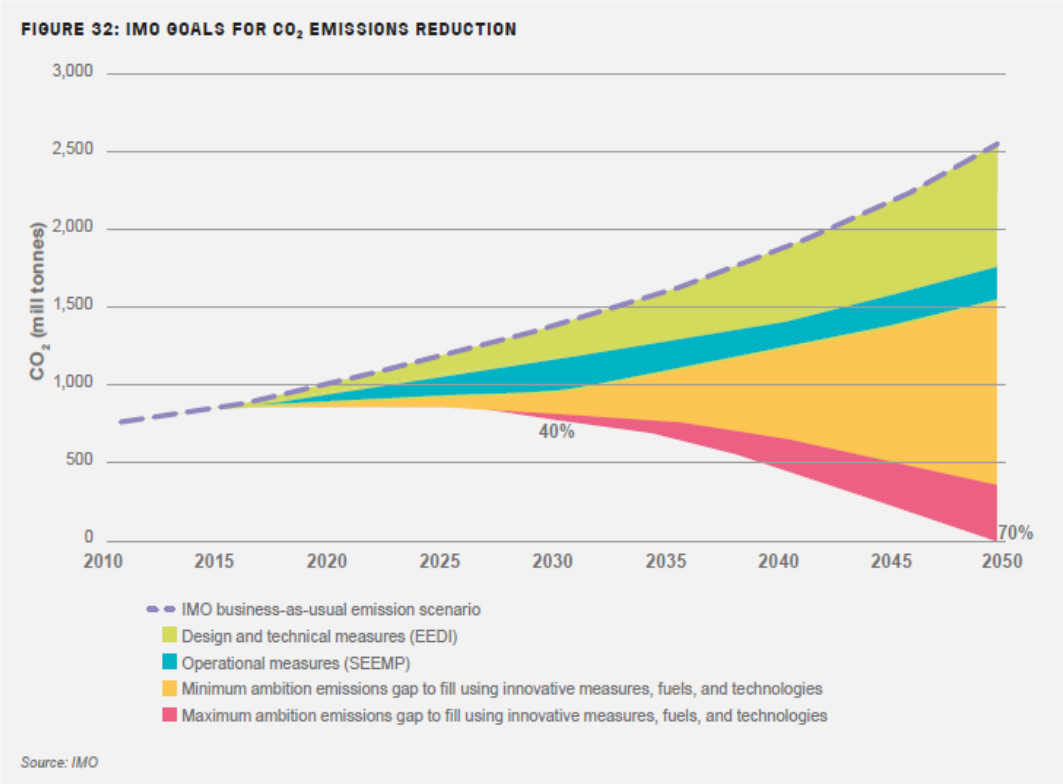
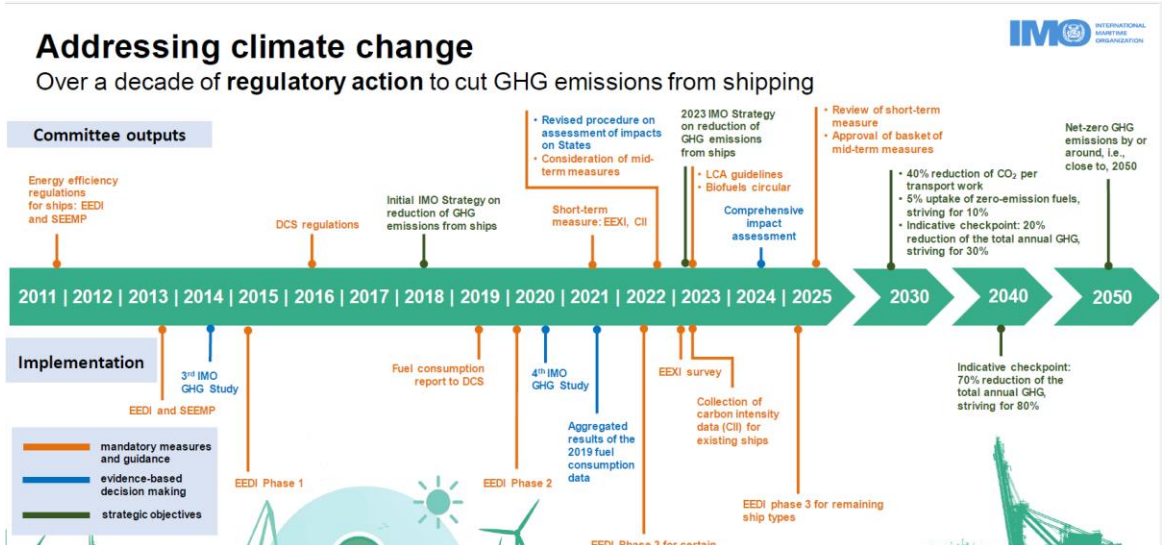
Fleet Director

Reduced Carbon Footprint : The back ground



Against this backdrop, every maritime stakeholder must adopt a strategy to reduce its carbon footprint in order to comply with the requirements of regulations, which are rapidly evolving towards ever more stringent constraints.



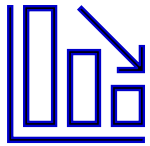
The IMO has set targets for reducing greenhouse gas and CO2 emissions and its ambition is to reduce the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030, compared to 2008.

Carbon footprint approach

Two main objectives

Internal :
Keeping track of your progress

- A forward-looking approach
- Moment T
- Analysis of results,
- Indicators Continuous improvement

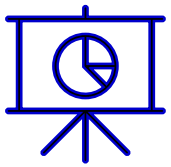


Objective: Identify a trajectory

External : Communication using a standardized method

Compliance with regulations and international standards

- Regulatory GHG assessment
- GHG Protocol (greenhouse gas protocol)
- ISO 14069 on the carbon footprint of companies



Objective: To ensure relevant reporting

Carbon footprint approach

Everything that can be measured can be changed

Fuel consumption
Speed
GHG Emission
Waste production

1

Units entered in the following items:
Energy (MWh)
Cold fluids (kg),
Raw materials (tonnes)
Other inputs (€)
Packaging (kg)
Freight (t.km)
Waste (kg)
Travel (km),
Fixed assets (m^2)

×

2

Emission factor :
Kg CO2 equivalent

=

3

Total GHG emissions
by item and by scopes

Scope

- Year under review: 2021
- Activity: Operator of research vessels for the French Oceanographic Fleet
- Scope : Vessels, underwater systems and seismic equipment, Logistics, technical department, and Support Functions Division
- All on-shore sites + Sailors + Sedentary
- Staff Workforce: 406 FTE
- Scope of study : Scopes 1, 2 and 3

Scope 1 = direct combustion of energy,
Scope 2 = indirect emissions via energy purchases (electricity produced by third parties)
Scope 3 = relates to the upstream and downstream value chains of the company's activities.

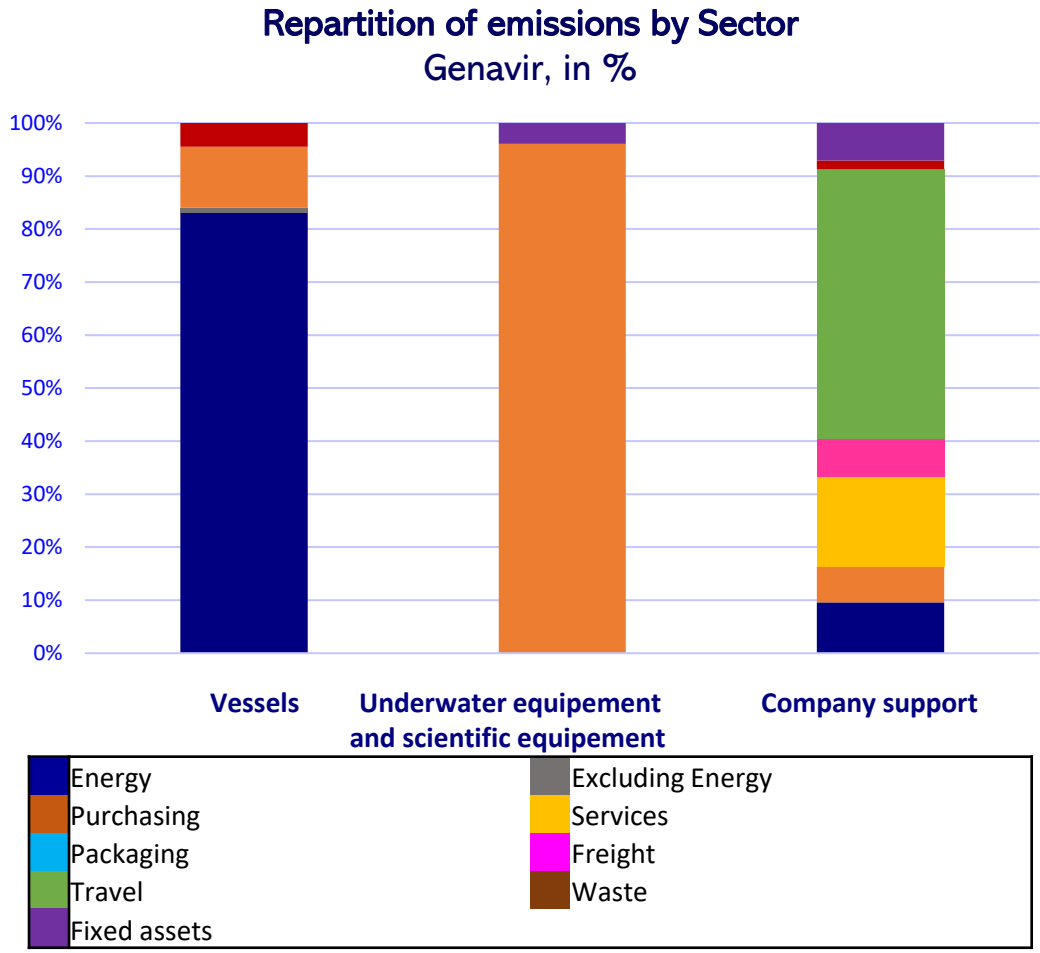
This Bilan Carbone® uses the ADEME reference 'Base Carbone V21.1', updated in March 2022.

Greenhouse Gas emissions

28 699 tCO_2e

Energy accounts for 76% of Genavir's greenhouse gas emissions (21,788 tCO2e), 75% of which is marine diesel oil. The second largest item is purchasing 14%.

- The Vessel division includes fuel consumption for ships, refrigerant fluids, purchases (food, etc.) and waste.
- The Underwater and scientific division covers all purchases related to this division, as well as underwater and scientific equipment.
- The Support division covers freight, packaging, travel, buildings and their energy consumption.



Activity indicator

Turnover 53 million €
or
540 $kgCO_2e/k€$

The kgCO2e/€ indicator is universal to businesses, and is used in particular for heterogeneous activities. However, it is not appropriate for climate performance, as it is not connected to physical flows.

In comparison...
'Maritime and inland transport', ADEME, Base Carbone:
590 kgCO2e/k€.

National average for goods transport by boat (2011)

1 127 Equiv PP
activity days or
25 tCO2e/day

This is the most relevant indicator for Genavir. It enables us to:

- *Measure any improvements in data accuracy*
- *Measure actions in favour of the climate, excluding growth*

406 FTE or
71 tCO_2e/employee

Services represent an activity with strong demand of man-power. Conversely, some sectors are highly mechanized.
By way of comparison, the average carbon footprint of a French person is 9.9 tCO2e.

What do 28,699 tCO2e correspond to?

14 350

return flights Paris-New York

or

479 118

MWh - *Annual consumption for 383 000 households*

Energy emissions : 21 788 tCO_2e (76%)

EMISSIONS BY ENERGY SOURCE

Fuel (Marine Diesel Oil) = 99%
Natural Gas = 1%
Electricity = 0%

Emissions from fuel consumption outweigh those from other energy sources.

Electricity is the least consumed energy at Genavir.

Only certain sectors of activity (transport, heavy industry) have energy as their primary source of emissions. On average, this is also the area where players have the greatest capacity for action.

Designation	Vessels	Underwater Scientific Equipement	Company Support	Unit	kgCO2e/unit	kgCO2e
Fuel MDO	5 619			TON	3 846	21 612 212
Electricity	15 213		508 064	kWh	0,06	29 801
Gaz			643 471	kWh PCI	0,23	145 875
$kgCO_2$/division	21 613 079		174 809	TOTAL		21 787 888

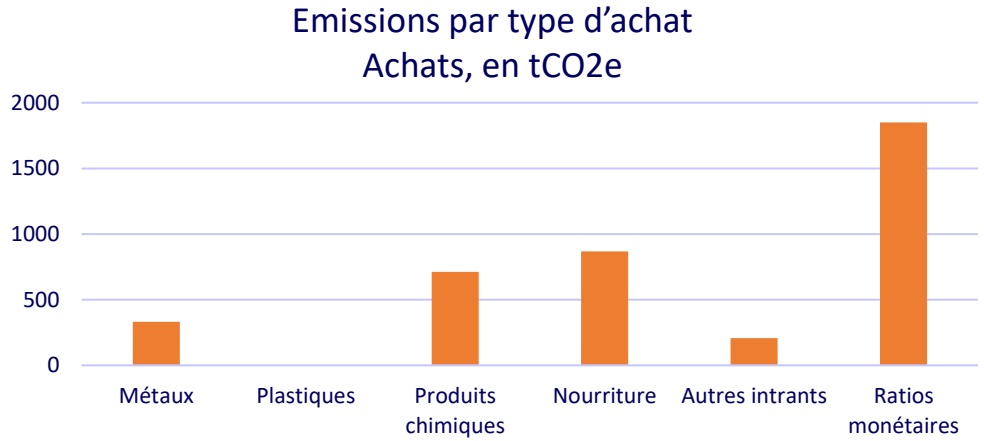
Purchases emissions: 3,970 tCO2e (14%)

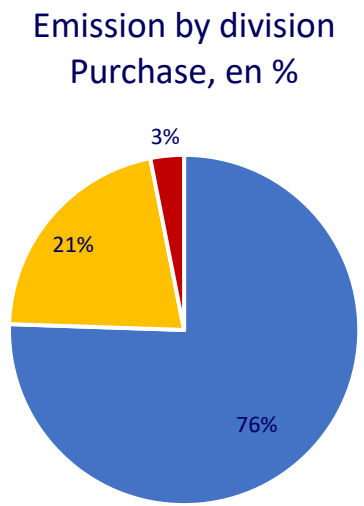
Title	Vessels	Underwater Scientific Equipement	Company Support	Unit	kgCO2e/unit	kgCO2e
Metals	79	2	1	Ton	4 041	332 341
Plastics	0,10	0,40		Ton	2 266	1 058
Chemical products	137			Ton	5 196	711 875
Food	99			Ton	8 768	868 007
Other inputs	38 095	4 527	8 143	Div	4,09	207 662
Electronics	1 892	1 285	267	W	0,11	376
Small supplies	29 858	2 102	7 084	€	0,37	14 330
Computers	152	954	216	unit	140	185 628
Furniture		106		unit	60	6 373
Water	6 084		575	m3	0,13	879
Other	109	80	1	unit	0,40	76
Monetary ratios	1 785	699	76	k€	722	1 848 645
kgCO2e/division	2 998 339	848 100	123 150		**TOTAL**	**3 969 588**

Monetary ratios: It was not possible to express the quantities purchased in physical units (kg, litres, etc.) for 51% of purchases.

These elements are therefore integrated in € of purchase (X € of metals = Y kgCO2e).
This method suffers from a high degree of uncertainty.

Food comes second, followed by chemical products.





Waste emissions: 1 189 tCO_2e (4%)

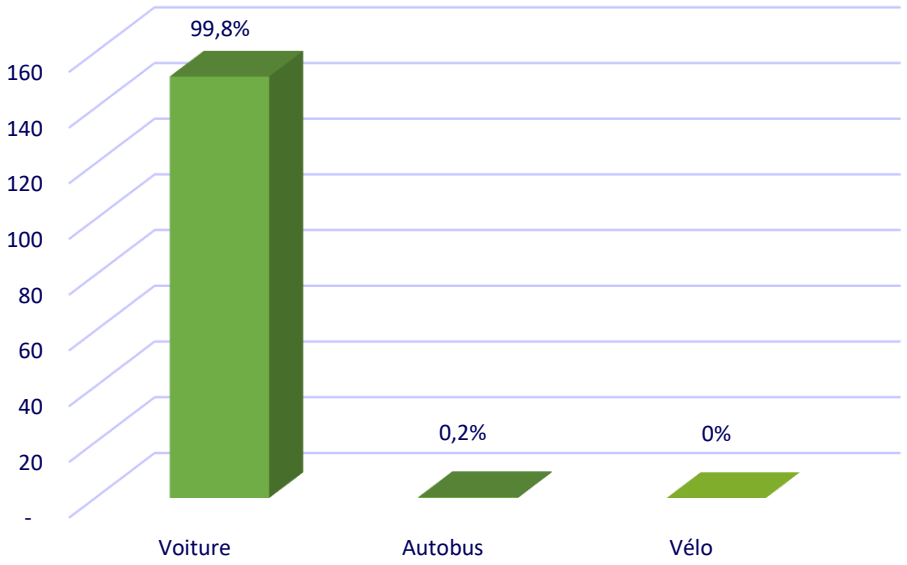
Title	Vessels	Underwater Scientific Equipement	Company Support	Unit	kgCO2e/unit	kgCO2e
Non-hazardous waste	584			Ton	1 720	1 004 318
wood and cardboard	242		48	Ton	859	249 001
metals	13			Ton	135	1 750
glass	1			Ton	320	320
plastics	328		5	Ton	2 262	753 247
organic waste and household refuse	132		1	Ton	689	91 593
waste batteries, accumulators and WEEE	2		2	Ton	2 155	8 618
hazardous waste	108			Ton	782	84 429
kgCO2e/division	1 158 712		30 246	TOTAL		1 188 958

The impact of a material (or product) depends in particular on its carbon concentration, whether it is a fossil, organic or inert material (such as metals).

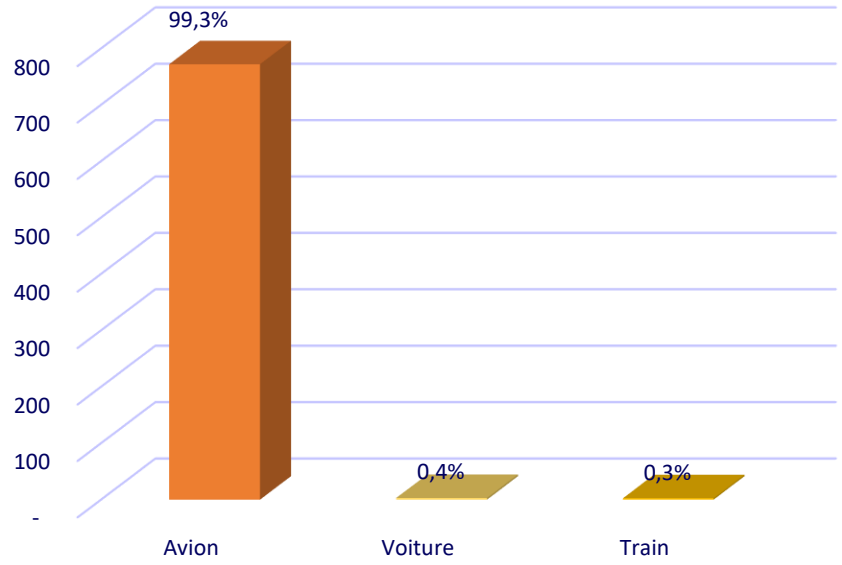
It also depends on how the waste is treated (incineration, landfill, etc.).

Travel emissions: 929 tCO_2e (3%)

Travel Transfert Home Office
Genavir, % et tCO2e



Business travel
Genavir, % et tCO2e



1,700 km by bike, i.e. 0.2% of home-to-work journeys.

→ Air travel is the most emissive mode of transport and the most widely used.

Genavir's global position

Energy is the most important aspect of this Bilan Carbone. It is also the item for which Genavir has the best data monitoring and the most work capacity.

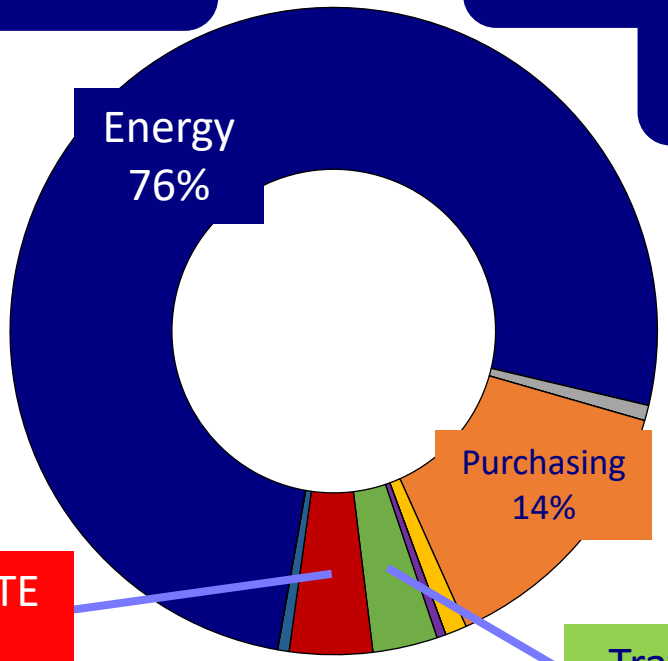
It should therefore be the focus of our efforts to reduce greenhouse gas emissions.
The other emissions items sometimes suffer from data that is not adequate for the Carbon Balance.
However, 8 out of 9 items are complete or nearly so.

To date, only the impact of shipbuilding is missing. It is necessary either to carry out a Life Cycle Assesment.

Greenhouse gas emissions balance
scopes 1 & 2 = 18 172 tCO_2e

Representing 63% of the total Bilan Carbone®.

Carbon footprint 28 699 tCO_2e …. and now?



Use of Biofuels, heat recovery systems, new maintenance critéria ≈-5 à -20%

Operating recent ships with low CO2 emissions,

Fleet renewal plan – Anita Conti
≈-3,5%

Speed reduction for transits
≈-4%

Energy-efficient renovation of buildings
≈-1%

Responsible purchasing policy
≈-5%

Less meat and more vegetable protein
≈-2%

Carbon tracking of waste≈-3%

Plane only for international≈-2%.

Roadmap to decarbonize our activities - 2030.

- Operating recent ships with low CO2 emissions,
- Use biofuels and develop energy recovery solutions, implement a new biofouling management, power limitation
- Opt for positive energy buildings,
- Implement a responsible purchasing policy,
- Improving catering management on board ships,
- Change in travel policy, giving priority to trains for short journeys.
- Change the way scientific campaigns are planned….

Bio Fuel Solutions

Regulation 18.3 of MARPOL Annex VI – Fuel oil availability and quality

FAME - Fatty Acid Methyl Ester

- BIO FUEL B8 to B20,
  - Bacterial proliferation and detachment of deposits
  - Incompatible materials
  - Low temperature
  - Intermittent operation.
- BIO FUEL B21 to B30
- BIO FUEL B30 to B100

HVO

Thanks to Mustafa's presentation, the generation of biofuels and its advantages, CII, EUETS and FUEL EU will no longer hold any secrets for you.

- **Focus on B20**

  The gain in CO2 emissions is not negligible, the reduction compared with the reference value DMA (91.16 gCO2eq/MJ) is 15%. The emission factor (EF) for B20 (or MGO20) is 77.3 gCO2eq/MJ).
  As far as the budget is concerned, the price impact of B20 is significant, at around 38%.

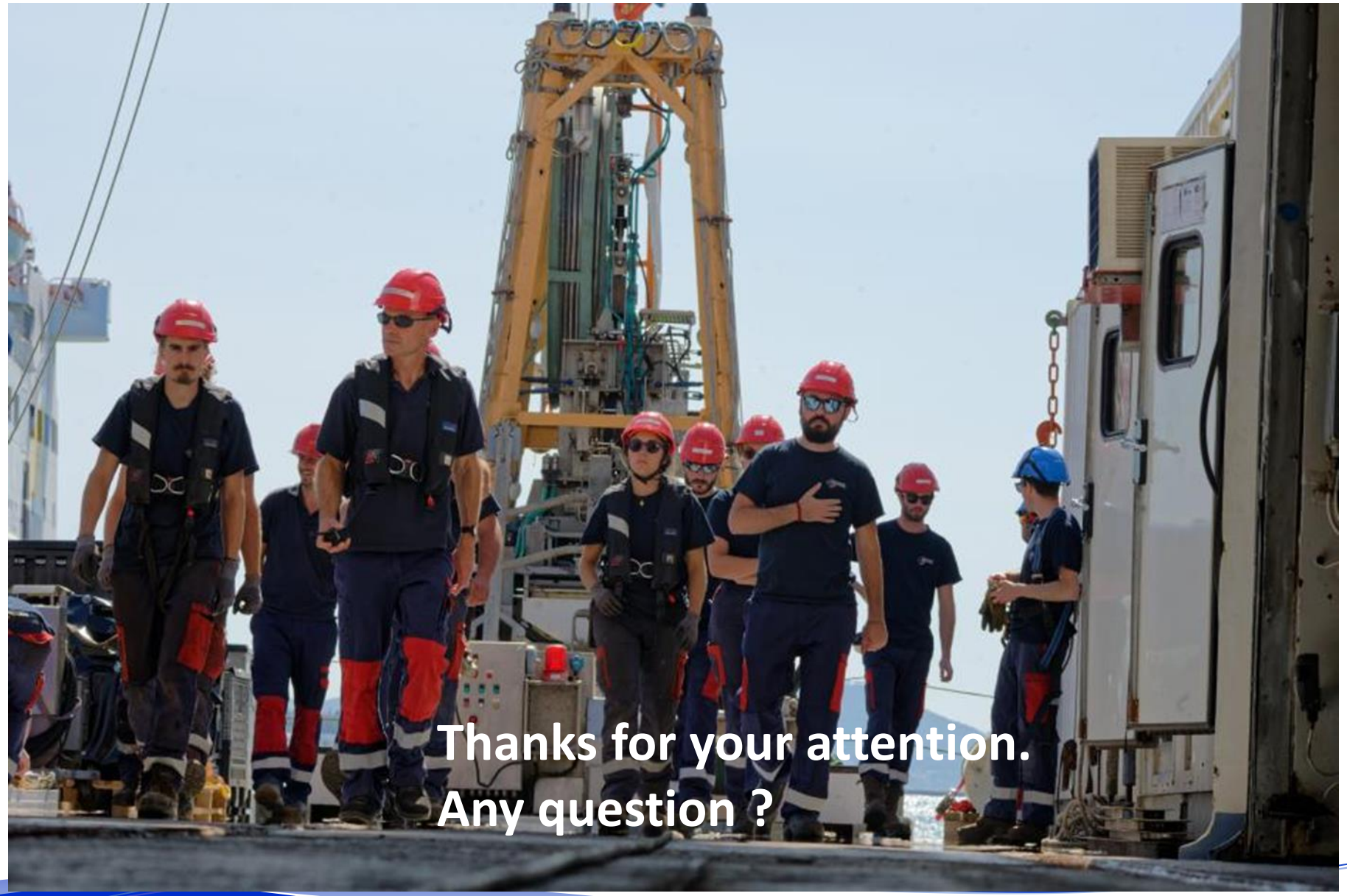
Improving catering management on board ships

Genavir is developing a new food policy to adapt to the demands of the ship-using community :

- Taking ecological issues into account
- Respecting seasonality and encouraging short distribution channels
- Choosing products with a low carborne footprint

Change the way scientific campaigns are planned.

- Speed reduction for transits
  Transit for PP = 14% of Time at sea and 25% of fuel consumption
  A reduction of speed below 7,5 nd leads to a higher fuel consumption.
  The expected gain is a reduction in overall consumption of around 4%.
- Transits account for a very large proportion of consumption. Planning campaigns by ocean basin would reduce the rate of transits.


Thanks for your attention.
Any question ?