# Eco-design charter
# HydroContest by ENSM

September 2024

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# Summary

Introduction to eco-design

Setting up a solution

1. Application
2. Sector challenges
3. Strategy to meet the challenges

Case studies

Summary

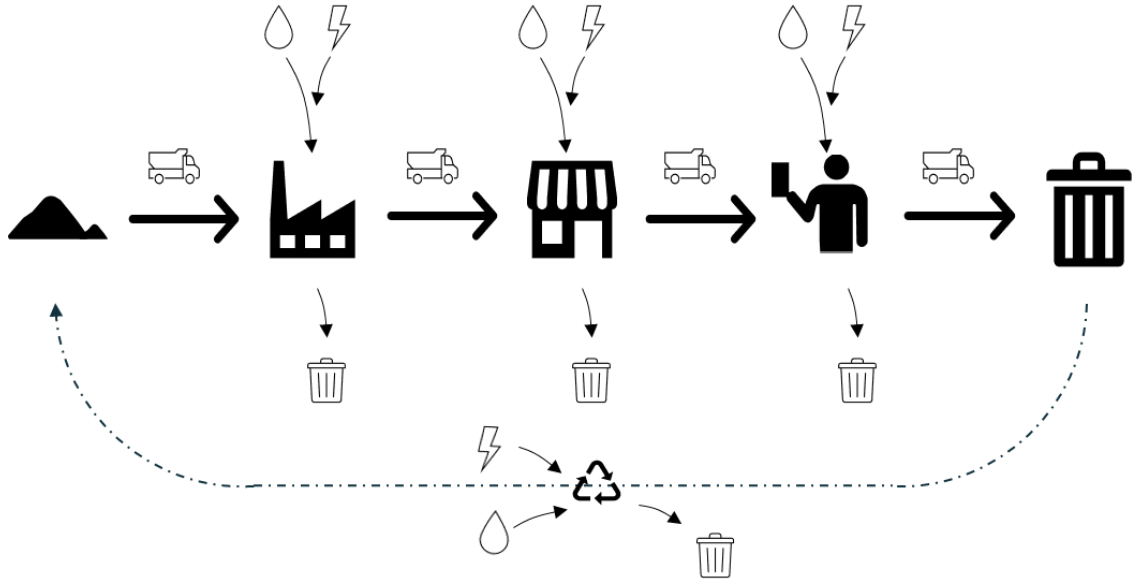
Appendix

# Introduction to eco-design principles

Here you'll find the definitions and premises of eco-design, with a view to applying them in the competition.

## Worth knowing:

# ALL PRODUCTS AND SERVICES HAVE AN IMPACT THROUGHOUT THEIR LIFE CYCLE

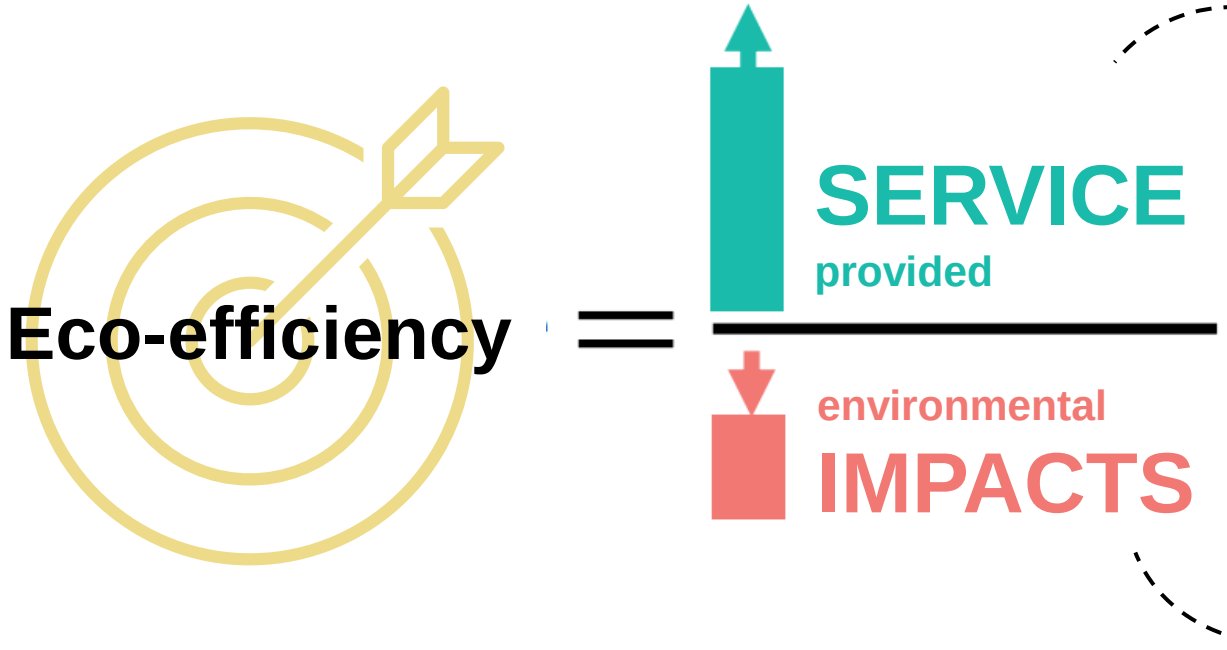


An **eco-designed product** is one that has **less (negative) impact** on the environment**,**
**throughout its life cycle** (from materials extraction to product end-of-life)
and **maintains its performance** during use. (compared with a product of similar use)
Reference document: ISO TR 14062 Guide

# Eco-design objective

Eco-design aims to achieve eco-efficiency.
Eco-efficiency is the ratio of service rendered divided by environmental impact.

Eco-design involves working on these two key parameters: **service provided** and **environmental impact**.




**Improving service and usage values:**
*Functional performance, Efficiency, Desirability, Ergonomics, Service life*

**While reducing environmental impact**
*Reduction in the quantity of materials, Materials of recycled origin, Optimization of energy consumption and transport, Recyclability...*

*Eco-design doesn't just mean "reduction", it also means "improvement".*

# The triple benefit of eco-design

**More RESPONSIBLE**

Reduce environmental impacts

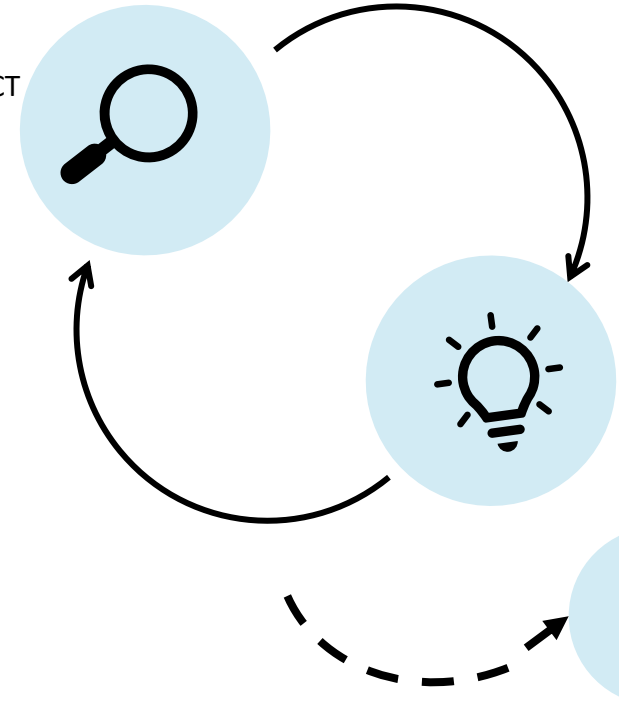

**Consideration of TECHNICAL and ECONOMIC requirements**

Is technically feasible and meets specifications
Costs can be optimized

**More or the same PERCEIVED VALUE for the consumer**

To meet customer expectations while remaining desirable and attractive

# The stages of an eco-design approach



**1 EVALUATE** | TO KNOW WHERE TO ACT

- What are the main sources of impact?
- What are the major challenges?

**2 IMPROVE** | TO SUGGEST A SOLUTION WITH LESS IMPACT

- What is the priority eco-design strategy?
- What are the objectives?

**3 PROMOTE**| TO CHALLENGE OURSELVES AND ENGAGE OUR STAKEHOLDERS

- On what evidence?

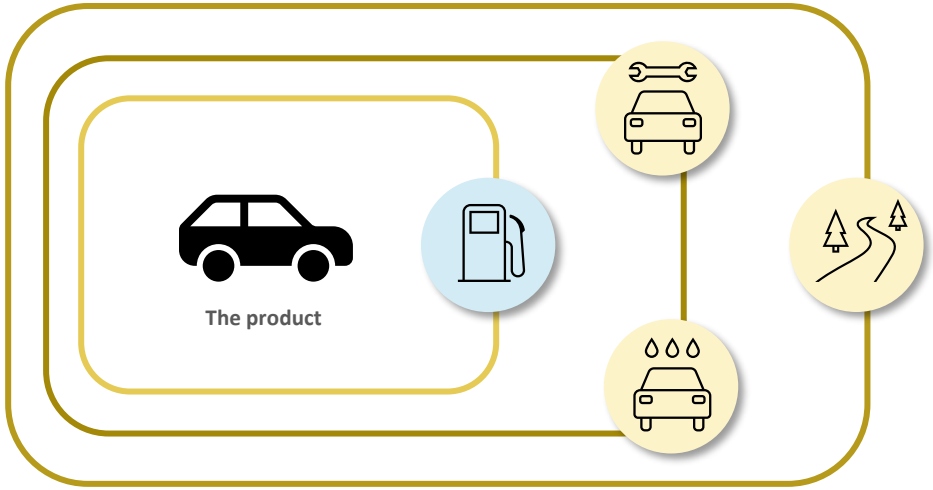
**4 DEPLOY, SYSTEMATIZE AND OPERATIONALIZE THE APPROACH** | TO MAKE IT TANGIBLE

- In what processes and at what stages?
- With which teams? Which tools?

# Four visions needed for eco-design

## 1 - Vision : COMPLETE SYSTEM

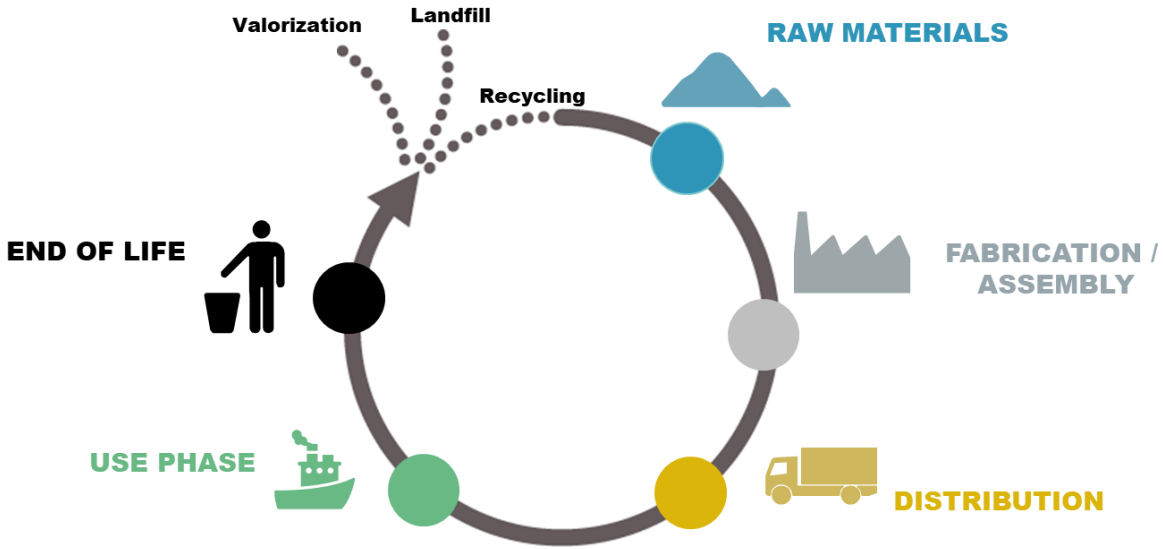
The final product generally depends on a set of products. It is important to consider not only the product itself, but also the **system of which it is a part**.




In the case of a car, for example, take into account consumables, maintenance/repair, servicing, infrastructure...

## 2 - Vision : LIFE CYCLE

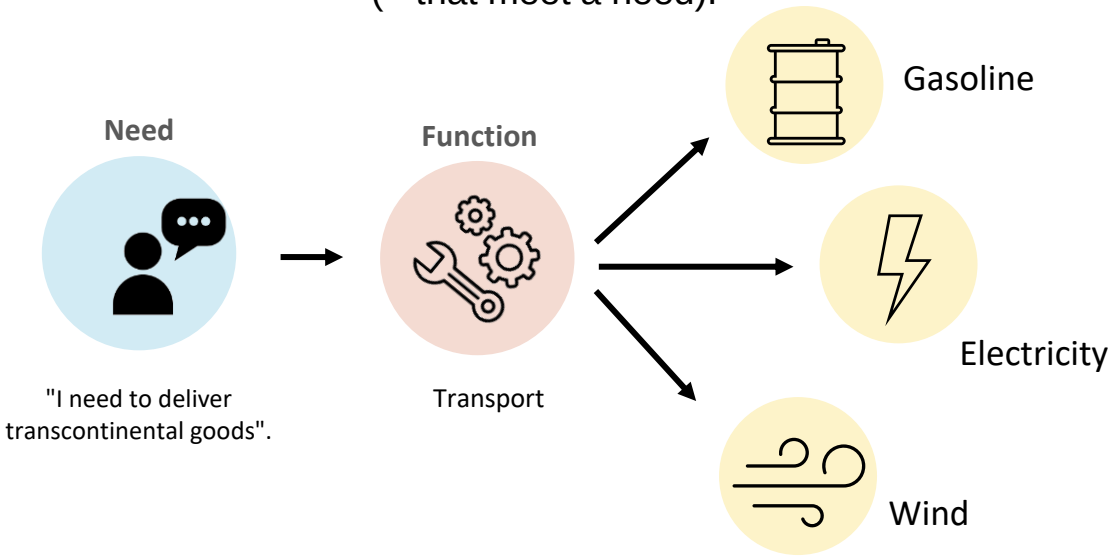
A product generates environmental impacts **throughout its life cycle**, not just at the time of production.



# Four visions needed for eco-design

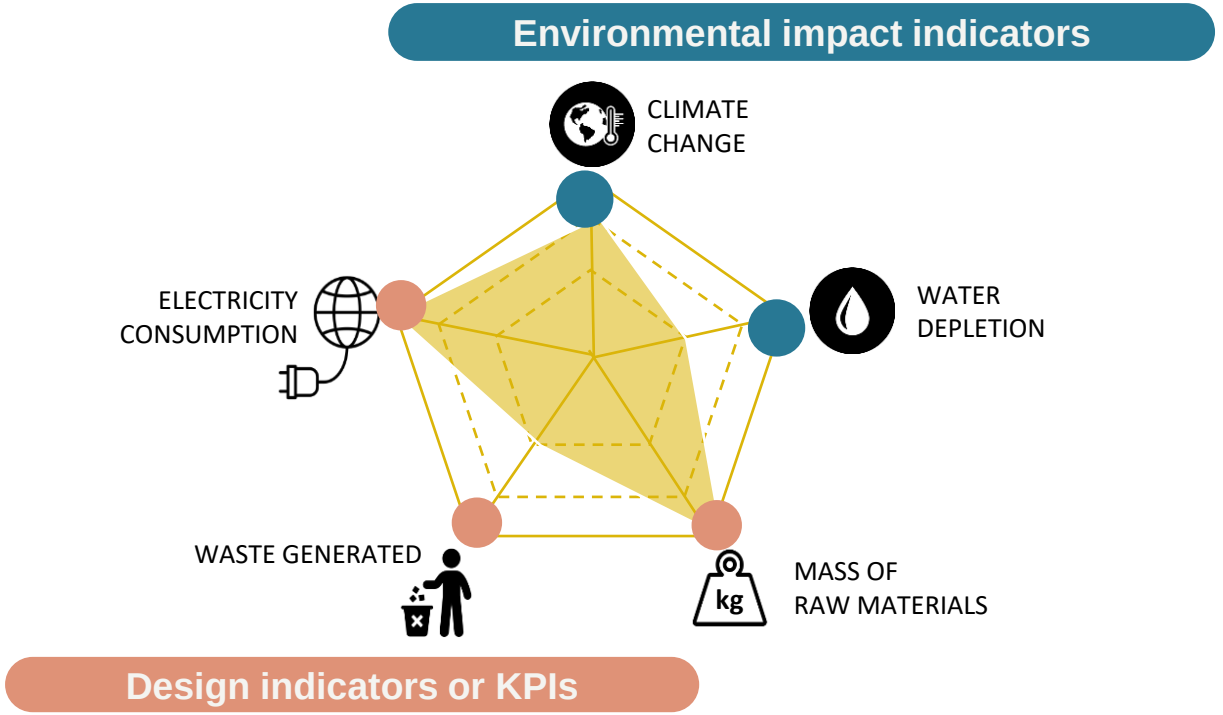
## 3 - Vision : FUNCTIONAL

To preserve and enhance the service provided, we need to think about the **functionalities** that justify the **product's raison d'être** (= that meet a need).




By thinking in terms of **use,** we broaden our field of vision: instead of talking about the "product", we try to respond to **"needs"**, which allows us to include other systems in the analysis, and **to imagine alternative solutions.**

## 4 - Vision : MULTI-CRITERIA




In an analysis, it is necessary to **select a combination of indicators** that address the issues of the product concerned, without restricting oneself to a single criterion**.**

# Example of existing tools for **assessing/comparing** environmental performance

## Simplified qualitative life cycle assessment

**Multi-criteria / Qualitative**

**Description :**
Simplified matrix for qualitative assessment of a product's environmental impact over its life cycle.

Allows issues to be identified.

It can be used without expertise.

**Example:**
**See next slide**

## KPI tracking

**Multi-criteria / Quantitative**

**Description :**
KPIs (Key Performance Indicators) are a universally understandable means of evaluation. They can be used to steer environmental improvement, with the advantage of requiring no expertise.
They can be used as a comparison tool

**Example:**
Rate of material reused, distance traveled, quantity of material, length of use, etc.

## Ecolizer

**Monocriteria / Quantitative**

**Description :**
A tool, in the form of a color chart, to assess the environmental impact of products at different stages of the life cycle.

**Source/link :**
https://www.eco-conception.fr/articles/h/l-ecolizer-l-outil-indispensable-pour-vos-projets-d-eco-conception.html

**Paying**

## Base empreinte

**Monocriteria / Quantitative**

**Description :**
Public database of emission factors and inventory data sets required for carbon accounting exercises

**Source/link :**
https://base-empreinte.ademe.fr/

**Free**

## Life Cycle Assessment

**Multi-criteria / Quantitative**

**Description :**
Method for assessing the environmental impact of products or services over their entire life cycle.

**Source/link :**
OpenLCA _ **Free**
https://www.openlca.org/
Ecoquery _
https://ecoquery.ecoinvent.org/3.10/cutoff/search
SimaPro _ **Fee-based**
https://simapro.com/

**Ecological common sense** | **Simplified LCA** | **Advanced LCA**

# Example of a Simplified Qualitative Life Cycle Assessment

| Lifecycle / Aspect about / health | MATERIALS | ASSEMBLY / FABRICATION | STORAGE | DISTRIBUTION / INSTALLATION | USAGE | END OF LIFE |
|---|---|---|---|---|---|---|
| **Resource depletion** | | | | | | |
| **Consumption** ***(energy, water, other ...)*** | | | | | | |
| **Emissions** ***(water, air)*** | | | | | | |
| **Waste production** | | | | | | |
| **Nuisances** ***(noise, odours, etc.)*** | | | | | | |
| **Accident risks** ***(Health & Safety)*** | | | | | | |
| ***Other*** | | | | | | |

**Note the importance of the issues at stake by cross-referencing life-cycle stages and environmental aspects.**

**Very important** **important** **Secondary**

**Comment: why is it a risk?**

# Environmental issues in the maritime sector

Highlighting the issues identified by various institutions and maritime experts, to determine which eco-design axis prioritize.

# Sector challenges

The maritime sector presents several challenges:

Economic :

- **70%** of the world's ton-kilometres are transported by sea.
- Access to certain strategic or essential resources.

**3 times greater than the share of road transport.**

Environmental :

- **3%** of global greenhouse gas emissions
- Ocean acidification
- Air pollution
- Underwater noise
- Loss of biodiversity

**If it were a country, it would be the 5th largest emitter in 2023*.**


*Source: https://edgar.jrc.ec.europa.eu/report_2023*

# Issues _ IMO: International Maritime Organization


In the roadmap of the International Maritime Organization (IMO),there are environmental issues such as :

- **Climate change (13)**
- **Preserving underwater life (14)**
- **Biodiversity loss (15)**

These are explicitly mentioned and should be considered in the development of future maritime activities, for all stakeholders.

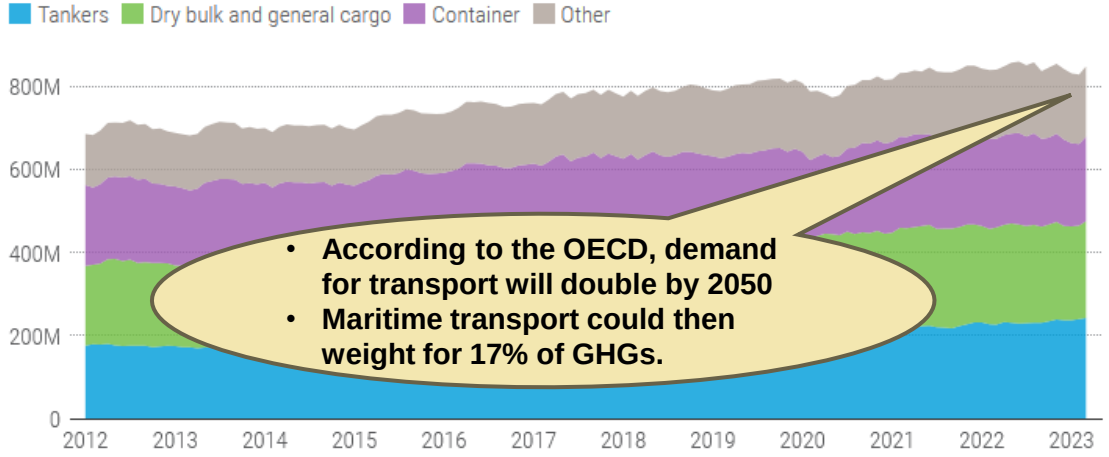
*Source :* https://www.imo.org/en/MediaCentre/HotTopics/Pages/SustainableDevelopmentGoals.aspx#number13
https://wwwcdn.imo.org/localresources/en/MediaCentre/Documents/SDG_Strategy%20and%20planning.pdf

# Issues _ United Nations

The UN report calls for a balance between environmental objectives and the sector's economic needs. It warns that the cost of climate inaction exceeds the required investments

## Shipping emissions are headed in the wrong direction

Carbon dioxide emissions by main vessel types, tons, 2012–2023




Note: The group "other" includes vehicles and roll-on/roll-off ships, passenger ships, offshore ships and service and miscellaneous ships.

*Source:* UNCTAD based on data provided by Marine Benchmark, June 2023. • Get the data • Download image

## Most ship-owning countries have seen a rise in emissions

Carbon dioxide emissions (tonnes) in 2012 and 2022 for 29 main countries of vessel ownership

Search in table

Page 1 of 3

| | Country | 2012 | 2022 |
|---|---|---|---|
| 1 | China | 43,493,613 | 102,317,721 |
| 2 | Japan | 99,628,524 | 101,254,900 |
| 3 | Greece | 69,330,862 | 95,968,419 |
| 4 | United States of America | 43,859,245 | 45,656,717 |
| 5 | China, Hong Kong SAR | 18,822,466 | 39,060,933 |
| 6 | Germany | 86,588,074 | 37,040,384 |
| 7 | Singapore | 19,806,355 | 32,522,147 |
| 8 | Korea, Republic of | 24,324,282 | 28,736,060 |
| 9 | Denmark | 23,473,417 | 28,007,662 |
| 10 | Norway | 25,748,700 | 26,496,768 |

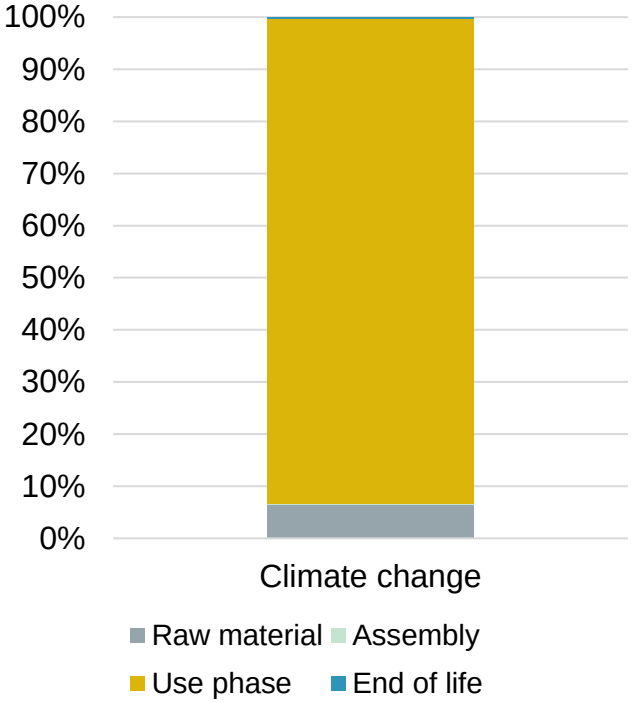
Note: Carbon dioxide emissions from vessels' main and auxiliary engines, calculated based on bunker fuel from the Automatic Identification System.

*Source:* UNCTAD, based on data provided by Marine Benchmark, June 2023 • Get the data • Download image

*Source : https://unctad.org/publication/review-maritime-transport-2023*

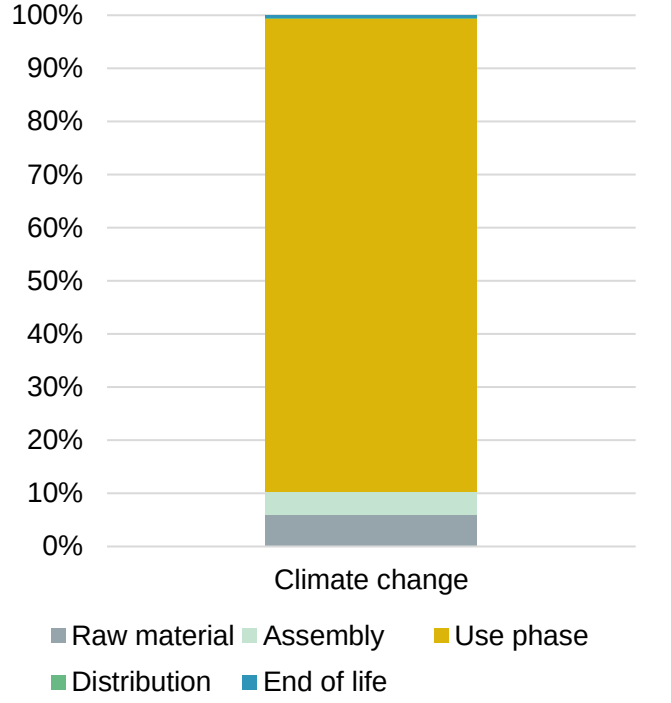
# Example of LCA for 3 types of ship _ focus on the climate change indicator

1.67E+05 tCO2eq



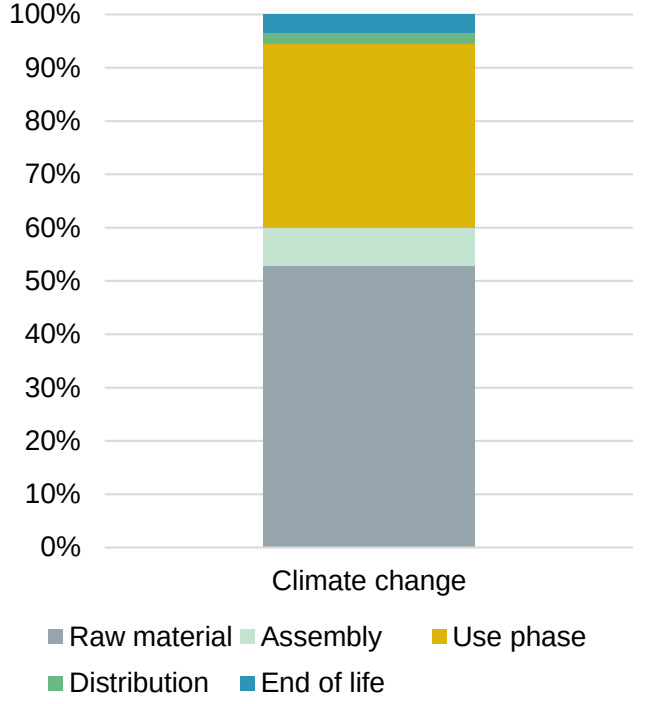

Scientific motor vessel _ 2,500 tons _ 30 years of use

1.44E+03 tCO2eq




Motor yacht _ 17 tons _ 30 years of use

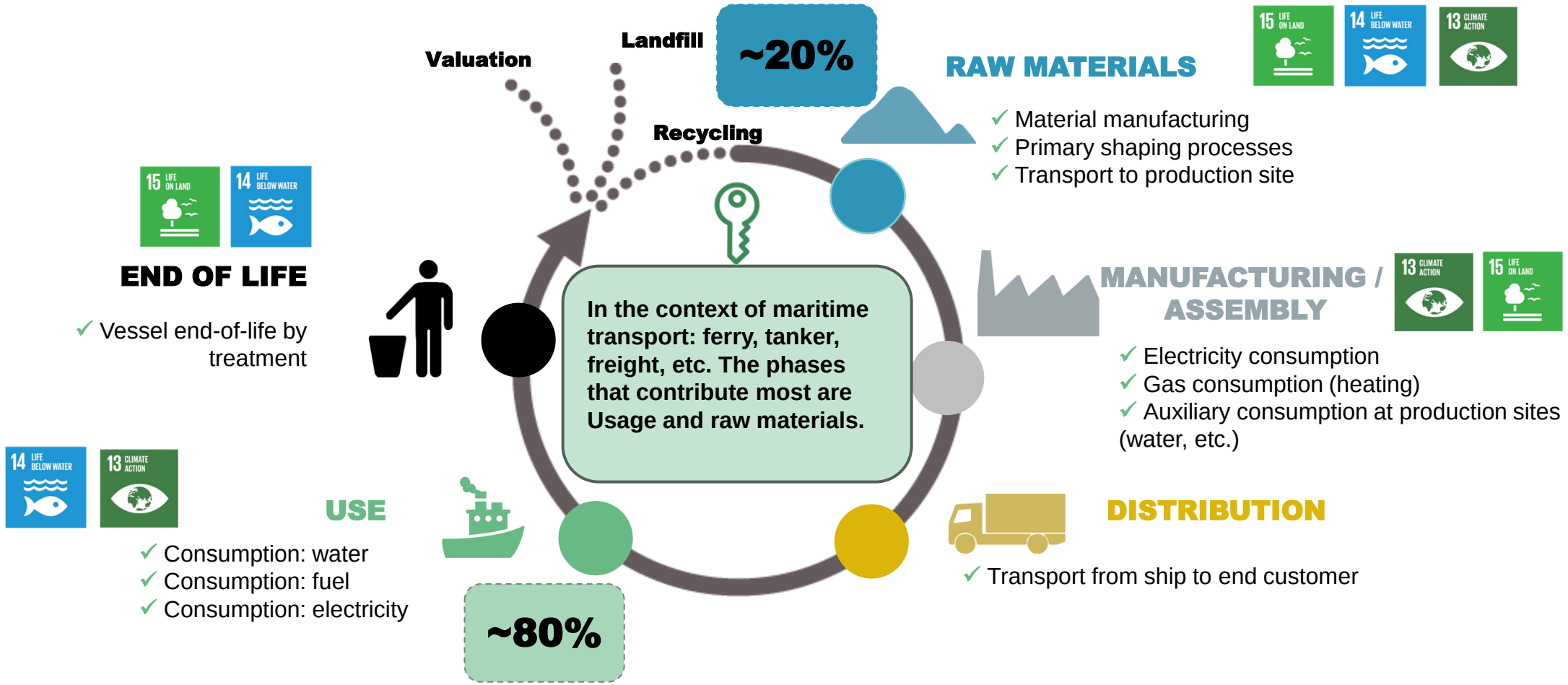
1.31E+02 tCO2eq




Pleasure sailboat _ 16 tons _ 30 years of use

Over the lifecycle of a ship, the installation of an engine makes the use phase the main source of impact on climate change, and therefore an eco-design lever to work on.

# To sum up, the major environmental issues in the life cycle _ Multi-indicators



# Implementing eco-design as part of the competition

This is a presentation of the process we propose to apply to HYDROCONTEST

# Eco-design process for the HydroContest 24-25

## 1 - Eco-design your concept (industrial-scale ambition)

Seek to clarify the following points

**What type of vessel, or sea craft, your project deal with ?**

- Freight transport
- Ferry
- Tankers
- ...

**What's the point of my project?**

**What are the specific challenges facing this type of vessel ?**

- Climate change
- Resource depletion
- Ocean acidification
- ...

**Which issue(s) does my project address (selection)**

**What eco-design strategy(ies) are proposed to address the selected issues ?**

- Resource criticality study
- Alloy benchmark
- Comparative study of environmental impacts using KPIs or LCA
- ...

**How can I justify the environmental benefits of my strategy? Is there a risk of impact displacement?**

## 2 - Eco-design your scale model

Seek to clarify the following points

**What eco-design approach(es) have you applied?**

- Material from production scrap
- cycling to the workshop
- Designed to be recyclable
- ...

By answering these questions, you'll be able to "pitch" the environmental benefits of your project on an industrial or scale-model scale, as well as your commitments to the eco-design approach → proofs and indicators!

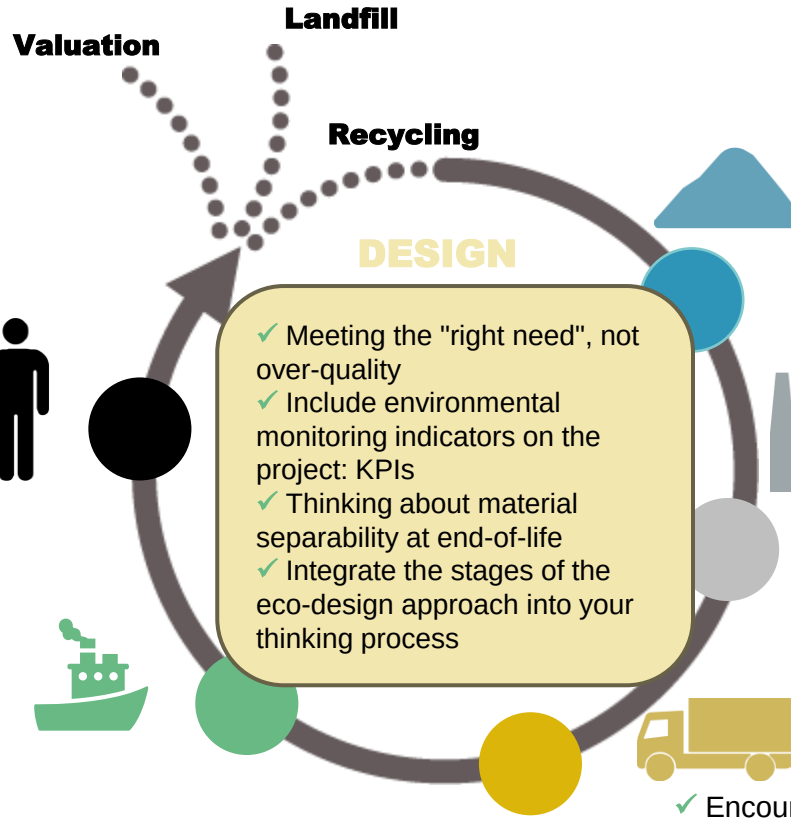
# Best practices for eco-designing your project

A non-exhaustive list of easy-to-remember points for reducing the environmental impact of your project: scale model

# Eco-designing your scale model

✓ Quick win list

Main source of impact for scale models




✓ Meeting the "right need", not over-quality
✓ Include environmental monitoring indicators on the project: KPIs
✓ Thinking about material separability at end-of-life
✓ Integrate the stages of the eco-design approach into your thinking process

## RAW MATERIALS

✓ Prefer the use of recycled or second-hand materials and recyclable
✓ Promote short supply circuits
✓ Optimize your materials

## MANUFACTURING / ASSEMBLY

✓ Favor mechanical assemblies
✓ Reduce electricity & gas consumption
✓ Maximize the use of portable machines
✓ Avoid assembling materials that are "incompatible for recycling".
✓ Encourage carpooling for home-workshop journeys

## Transport to the competition site

✓ Encourage "soft" transport to get to the competition site
✓ Limit total weight
✓ Limiting over-packaging of scale models (and associated waste)
✓ Optimize shipping with a spare parts model

## USE

✓ Reduce fuel consumption
✓ Limit replacement of parts during the competition phase

## END OF LIFE

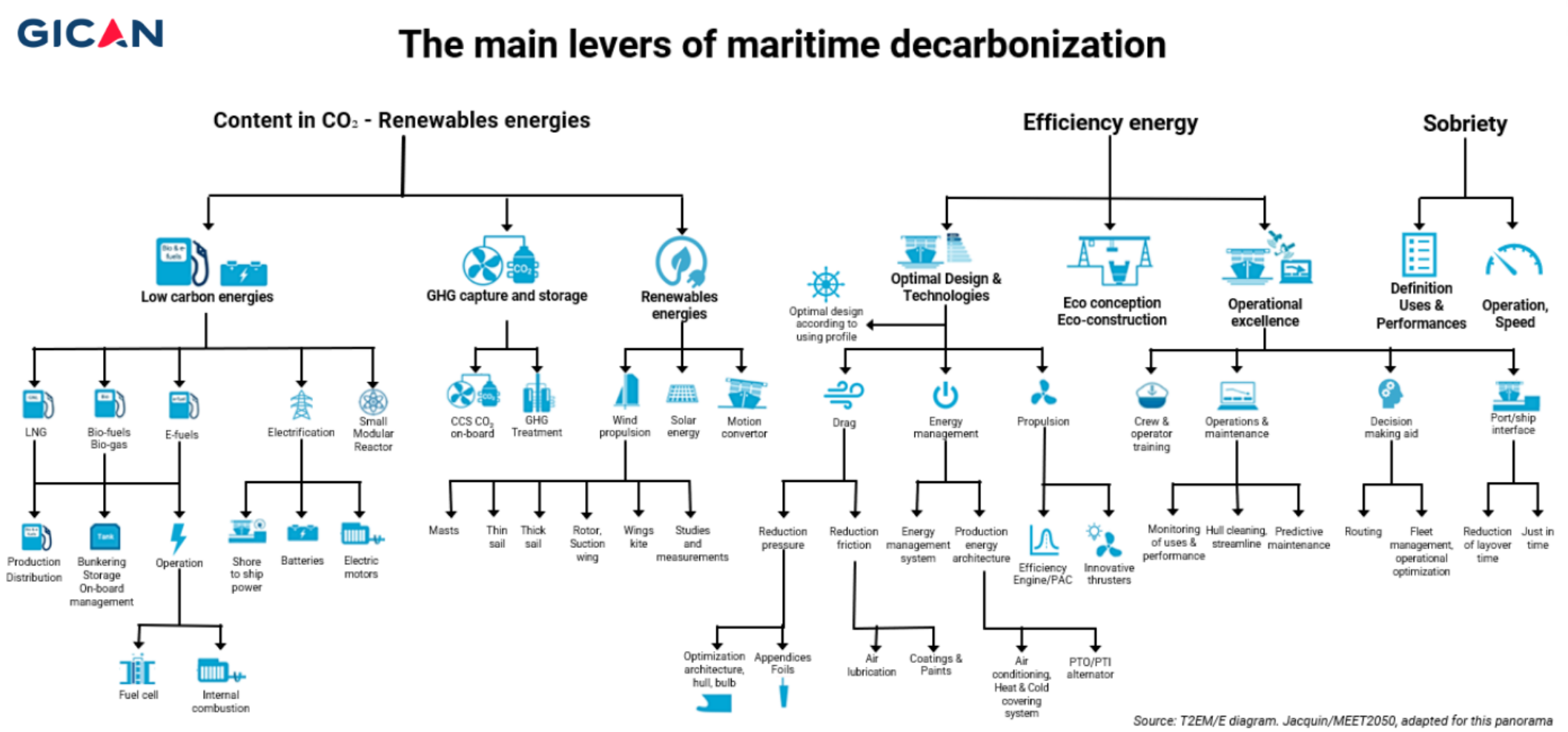
✓ Separate the various components of the vessel to recycle or recover them through specialized channels: metals, WEEE, composites, etc.
✓ Calculate the recyclability of your model


thanks

# Appendices

Here you'll find examples of innovations, guides and strategies implemented in the maritime sector.

# Decarbonization strategy _ Example




*Source : https://gican.asso.fr/en/the-naval-industry/overview-of-french-solutions-for-decarbonization-2/*

# Setting environmental criteria _ Example

LEVELS SCALE

**The results reflect the environmental performance of each participant in 2022 for each of the indicators on a 1-to-5 scale.**


| SHIP OWNERS | AIR EMISSIONS -GHG | AIR EMISSIONS -NOX | AIR EMISSIONS - SOX | AQUATIC INVASIVE SPECIES | OILY DISCHARGE | SHIP RECYCLING | UNDERWATER NOISE | WASTE MANAGEMENT |
|---|---|---|---|---|---|---|---|---|
| ARANUI CRUISES | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| BALEÀRIA EUROLINEAS MARITIMAS S.A. | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| BOURBON OFFSHORE SURF | 1 | 3 | 2 | 2 | 2 | 1 | 1 | 1 |
| BRITTANY FERRIES | 2 | 5 | 5 | 2 | 2 | 2 | 3 | 2 |
| CMA CGM | 3 | 4 | 3 | 4 | 3 | 2 | 2 | 3 |
| MANCHE ILES EXPRESS | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| COMPAGNIE MARITIME NANTAISE - MN | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 |
| COMPAGNIE MARITIME PENN AR BED | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| CORSICA LINEA | 2 | 3 | 4 | 2 | 2 | 2 | 2 | 2 |
| HOVERTRAVEL | 2 | 2 | 2 | n.a. | 2 | 1 | 2 | 2 |
| IFREMER-GENAVIR | 2 | 3 | 3 | 5 | 3 | 1 | 5 | 3 |
| LA MERIDIONALE | 3 | 3 | 3 | 2 | 2 | 1 | 3 | 1 |
| L'EXPRESS DES ILES | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| LOUIS DREYFUS ARMATEURS | 3 | 4 | 3 | 5 | 4 | 5 | 3 | 3 |
| MARITIMA | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 2 |
| MSC CRUISES | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| ORANGE MARINE | 2 | 3 | 4 | 2 | 4 | 2 | 2 | 4 |
| PONANT | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 |
| SOCATRA | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| SOGESTRAN SHIPPING | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| SOMARA | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| SPM FERRIES* | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| STENA LINE | 2 | 5 | 3 | 1 | 1 | 2 | 1 | 3 |

* Participant whose results have not yet been verified.

*Source : https://greenmarineeurope.org/media/mgmlydx5/gme_2022_performance_report_final.pdf*

# Eco-design

**Ecodesign guide**

- At the end of 2019, the French Nautical Industries Federation (FIN) noted that there was room for improvement in waste recycling and composites management.
- With the help of other sectors: automotive (CNPA), aeronautics (GIFAS), wind power (SER and FEEE), road transport and plastics (POLYVIA), FIN has written a guide to the recycling and eco-design of composites (GREC), in partnership with 3 technical centers and ADEME.

- The GREEK: https://librairie.ademe.fr/dechets-economie-circulaire/5630-guide-du-recyclage-et-de-l-ecoconception-des-composites.html

- You can find :
  - A qualitative and quantitative mapping of material flows and waste deposits in the French composites industry.
  - The state of the art in low environmental impact composite solutions
  - A state-of-the-art review of current recycling options for composite waste materials
  - A directory of French companies able to process composite waste

# Eco-labels

**Wings of the ocean**

- Creation date: 2022
- Audience: Boaters
- Objectives:
  - Promoting pollution control in the maritime environment and highlighting sailors' commitment to eco-responsibility
  - Create a network of players - map pollution points around the world to better understand man's impact on the marine world.
- Accessibility criteria :
  - Owning your own boat
  - 3 depollutions per year
- Advantages :
  - Address book of brand and chain partners
  - Wingsoftheocean offers boat and nautical equipment repair services or financial benefits.
  - Label badge + pollution control kit

# Eco-labels

**Blue boat**

- Creation date: 2003
- Founded by the French Nautical Industries Federation
- Label with the highest search engine ranking
- Public: pleasure boaters + professionals invited to join the initiative
- Objectives:
  - Promoting environmentally-friendly products
  - Companies that commit to the label are also better prepared for new, increasingly restrictive environmental regulations.
- Accessibility criteria :
  - For members only
  - Awarded to new boats and equipment guaranteeing an efficient black water management system (toilet waste) and preventing overflow during refuelling.

⇒ **FIN initiates, pilots, coordinates and promotes** the experiment and its partners.

⇒ **The marine parks are stepping up their efforts to raise awareness among** beach-goers, with the introduction of a range of tools including best practice guides, trained eco-guards and local monitoring.

⇒ **Professional volunteers offer boats that are well-maintained and equipped for freshwater, blackwater and waste management, with engines that comply with environmental standards.** They use organic products and educate their customers.

⇒ **Boaters behave responsibly** on board.

# Eco-labels

**Green Marine Europe**

- Created in 2020 following collaboration between the NGO Surfrider Europe & Alliance Verte - Supported by ADEME
- First voluntary environmental certification program for the European maritime industry
- Objective:
  - Achieve concrete, measurable improvements in the environmental performance of the marine industry by going beyond existing regulations.
  - Adapting the North American model to Europe

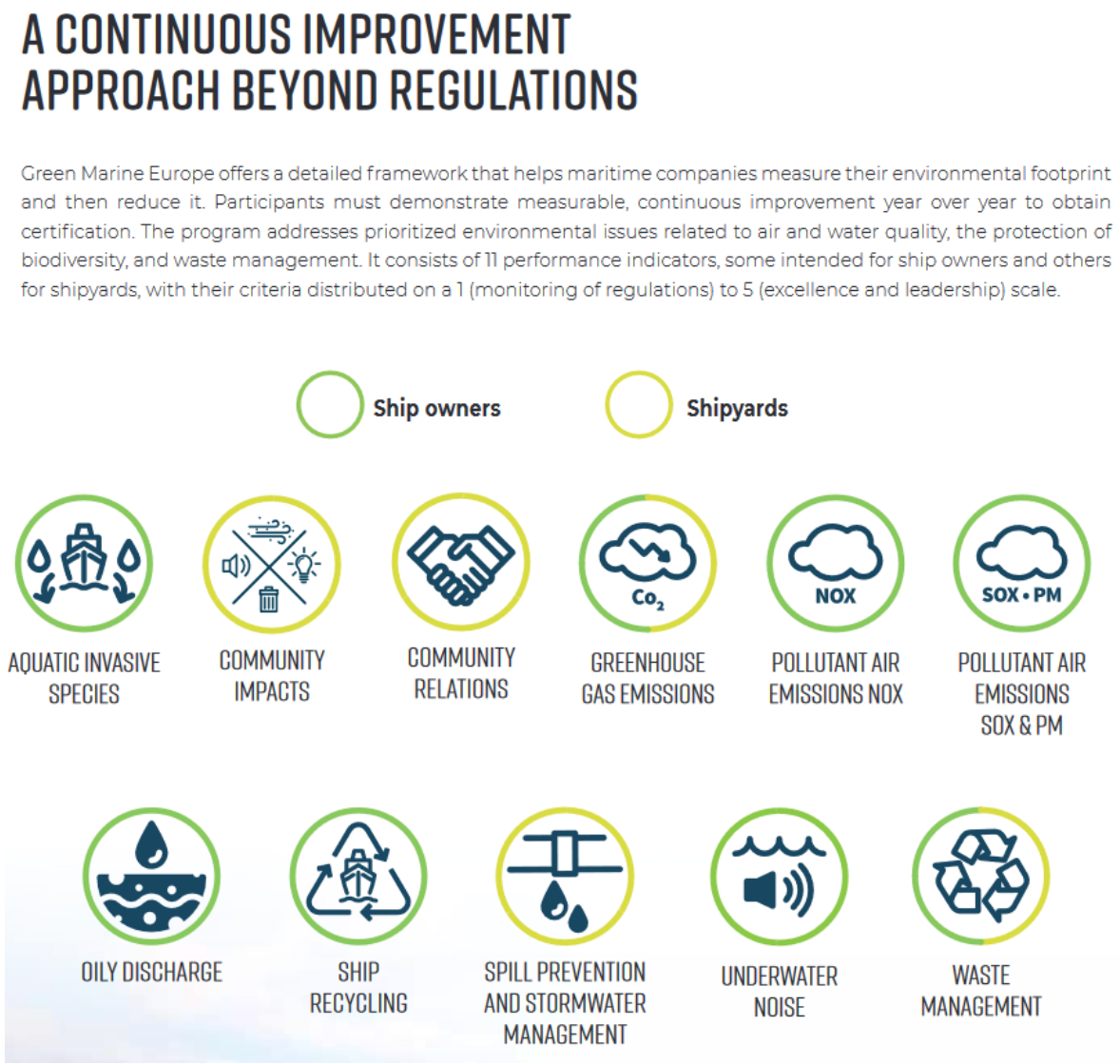
• Green Marine Europe has established 6 guiding principles to which label applicants must commit:

- Demonstrate **corporate leadership** in the search for environmental best practices based on a sustainable development approach
- Operate **responsibly**, seeking to **minimize environmental impact**
- Strive for **continuous improvement** in environmental performance
- Developing and promoting **voluntary protection measures**
- Integrate sustainable development practices that are **technically and economically feasible**
- Work with **governments** and **citizens' groups** to implement Green Marine Europe's environmental program.

# Eco-labels

**Green Marine Europe**

- Accessibility criteria: self-diagnosis of shipowners based on 8 criteria. 27 member shipowners in 2024, more than 500 ships. Shipyards eligible for membership in 2024.
- Diversified business sectors: passenger ships, container ships, bulk carriers, tugs, offshore vessels, service vessels.




*Source : https://greenmarineeurope.org/media/mgmlydx5/gme_2022_performance_report_final.pdf*


thanks