



POWER AT SEA

ELECTRIC HYBRIDIZATION OF SHIPS

Jean Veymuller (Naval group) & Thierry Meunier (EDF)

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CLIMATE AND ATMOSPHERIC POLLUTION ISSUES

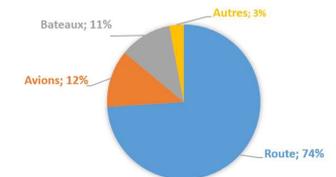
- ▼ **CO2 Emissions in France :**
 - ▶ Main cause of global warming
 - ▶ **38 % of CO2 emissions come from transports**

CO2 emissions by economic sector France

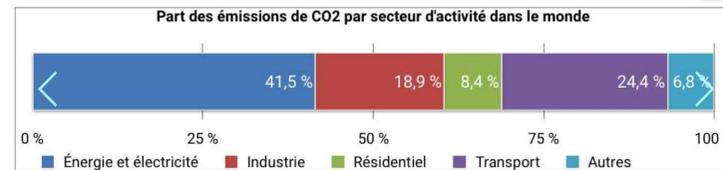


Worldwide :

EMISSIONS DE CO2 PAR MODE DE TRANSPORT DANS LE MONDE



Part des émissions de CO2 par secteur d'activité dans le monde



▶ Maritime transport is: 2.5% of global CO2 emissions, including 31% of these global emissions in European seas for which...

- ... International ships emit approximately :
 - 15 % des NOx,
 - 20 % pour le SO2
 - 20 % pour les PM2,5.

Fig. 1 - Localisation des zones de contrôle des émissions (zones ECA)



SECA and ECA areas worldwide and in Europe. OPS in development everywhere GNL for ships...

➤ Road transport is the main emitter of emissions impacting public health and the environment, nevertheless others modes such as sea and air are also concerned. Low carbon electricity production is essential.

WHAT ARE POSSIBLE LEVERS ?

Levers

Stakes & limits



Increasing electrification of ships :
Pooling and optimized energy management, scalability, clean sources

- Trend started
- Massive electrification of uses
- Integrate digital technologies, batteries, fuel cells,...



Economy of means:
Improve the energy efficiency of systems

- Knowledge
- Optimizing systems and uses
- Recover lost heat



Energy mix :
Alternatives to fossil fuels (bio fuel, synthetic fuels, Hydrogen, etc.)

- A necessity : fuels will play a 50% role in achieving the objectives set

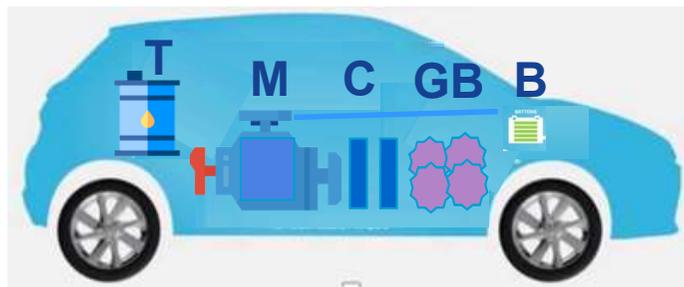


Standards/regulations Ecodesign :
Methods & engineering, audit, measurements

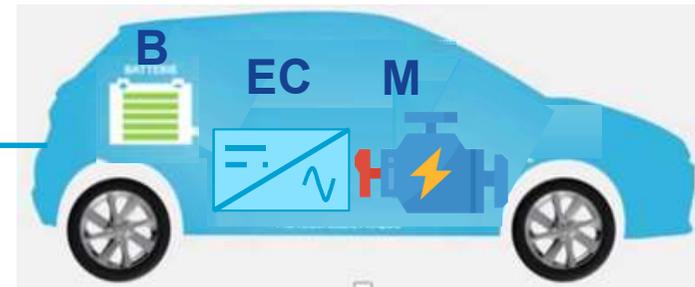
- Integration of the entire value chain

- ✓ Consume less and better
- ✓ Alternatives fuels
- ✓ Mix of solutions adapted to specific uses

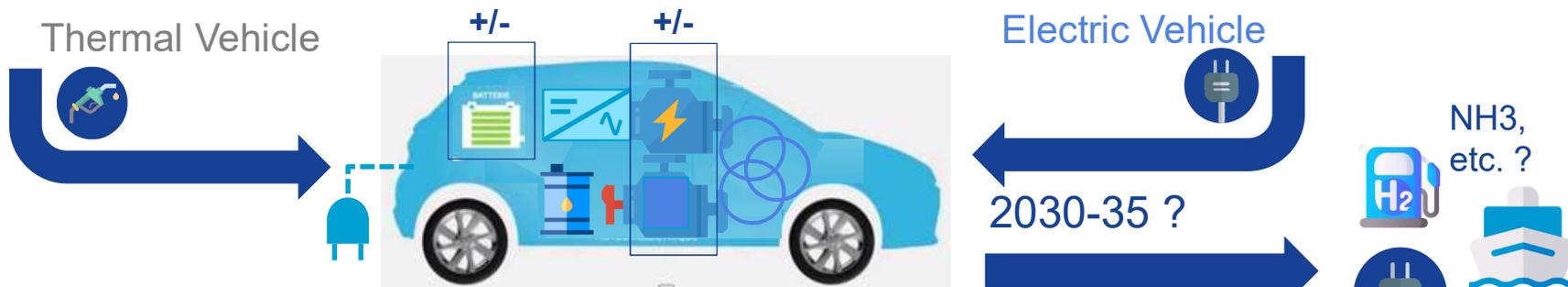
AUTOMOTIVE HYBRIDIZATION



Thermal Vehicle



Electric Vehicle

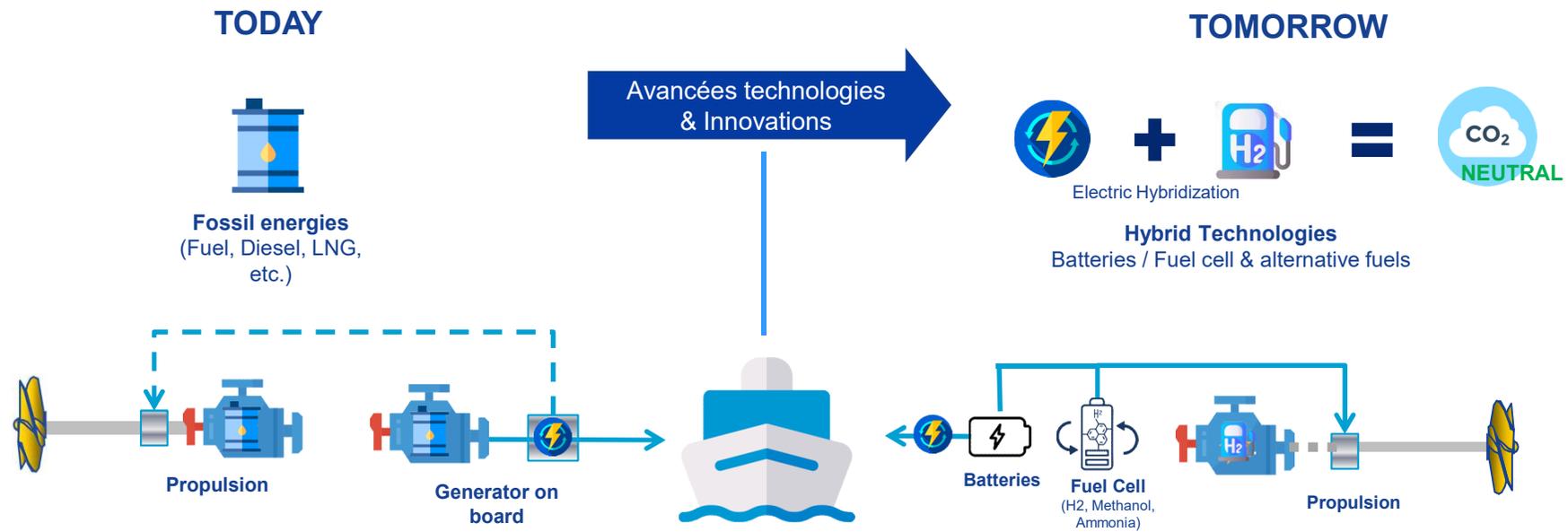


Hybrid Vehicle and plug-in

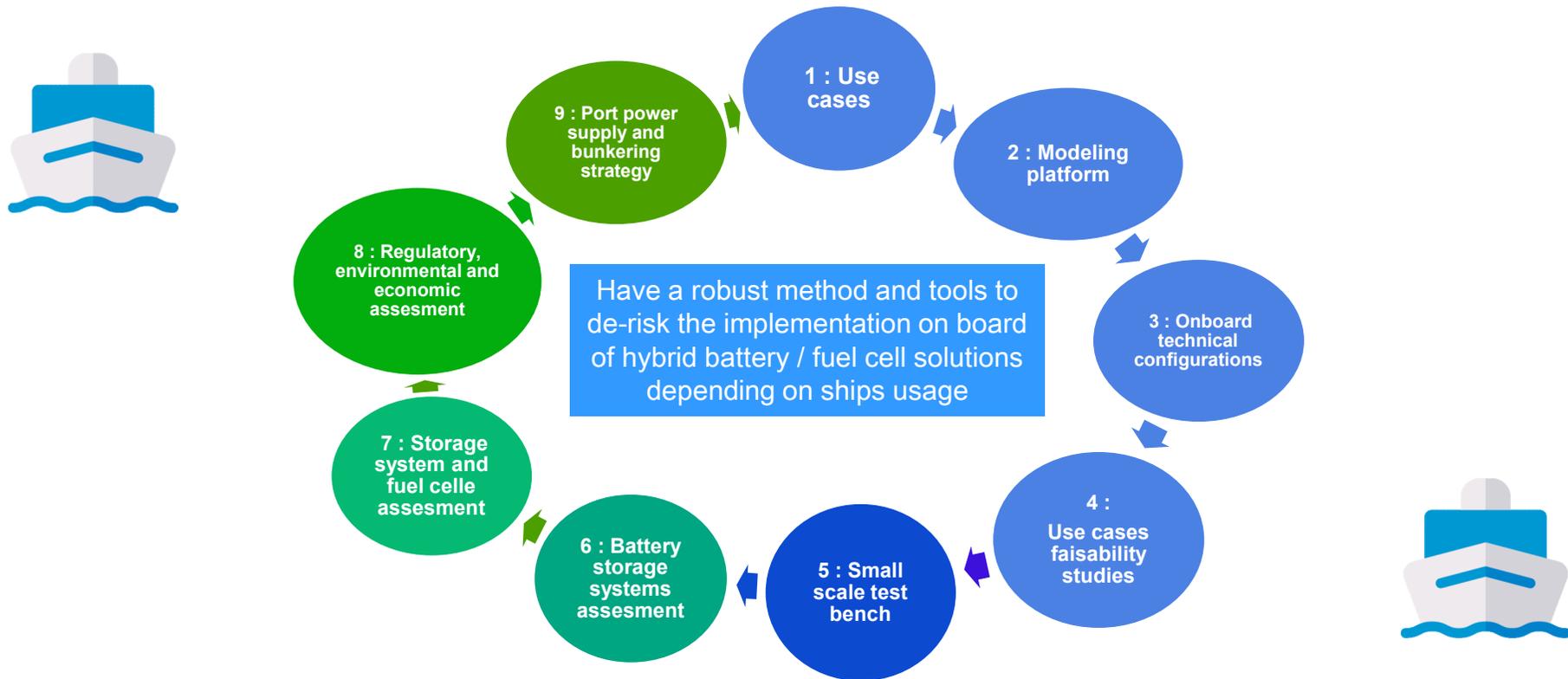
➤ Hybridization of thermal vehicles depending on use can reduce consumption by 15 to 30% or even 50% for plug-ins depending on use

ELECTRIC HYBRIDIZATION OF SHIPS

Electric hybridization of ships, one of the means to achieve carbon neutrality ?



GOAL AND TASKS OF THE PROJECT



NAVAL
GROUP

