

**FINCANTIERI S.p.A.**

**MECHANICAL SYSTEMS AND COMPONENTS B.U. (DSCM)**

***Our Effort Toward Decarbonization***

**FINCANTIERI**

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Genoa, 25<sup>th</sup> January 2024

# Highlights



**Fincantieri DSCM ... who we are**

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**Energy transition scenario in shipping and future perspectives**

- Regulatory Framework
- Our perspective...

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**Fincantieri DSCM: Our Efforts Towards Decarbonization**

- today
- tomorrow
- ...the day after

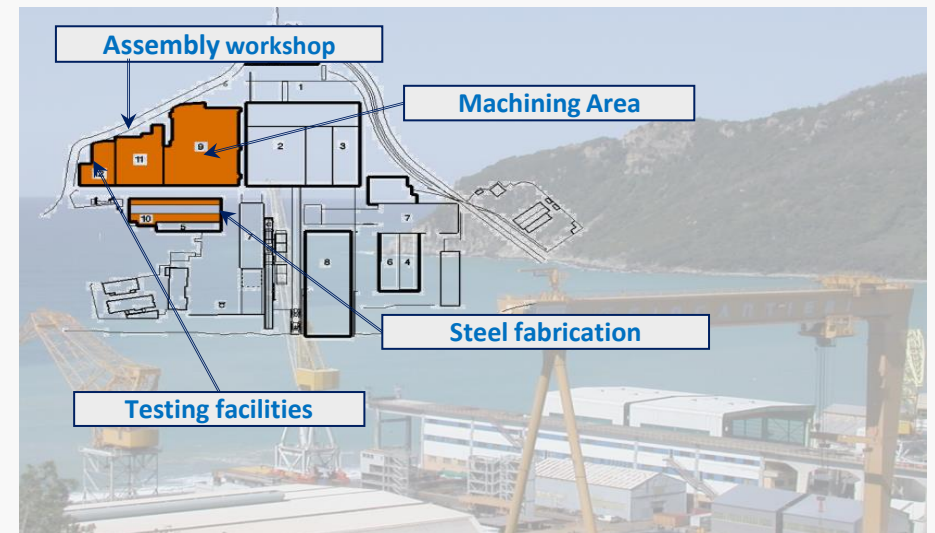
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# Fincantieri DSCM ... who we are












- One of the **reference world-wide players** in the **design, construction** and **servicing** of **mechanical systems and components**, and **customer tailored turn-key solutions** in Naval, Cruise and Offshore markets.
- Engaged in both **Maritime AND Industrial Market** segments thanks to our own designed and produced **Steam Turbine systems**.

- A **Business Unit of Fincantieri S.p.A.** with headquarters, offices and workshop at Riva Trigoso Shipyard (Italy).



# Fincantieri DSCM ... who we are

Market	Products	Positioning	Clients
<p>Cruise Ships</p> 	<ul style="list-style-type: none"> <li>Stabilization Systems</li> <li>Thrusters</li> <li>Steam Turbogenerator sets for on board Energy Saving (THR )</li> </ul>	<ul style="list-style-type: none"> <li>Worldwide leader for retractable fin stabilizers for cruise ships</li> <li>Advanced Products</li> <li>Green Package</li> </ul>	
<p>Naval Vessels</p> 	<ul style="list-style-type: none"> <li>Propulsion (propellers and shaft lines)</li> <li>Stabilization Systems</li> <li>Thrusters</li> <li>Steering systems</li> <li>Ramps, Hatches, elevators</li> <li>Gas turbine packages</li> <li>Landing Grid</li> </ul>	<ul style="list-style-type: none"> <li>Italian Navy qualified Supplier</li> <li>Worldwide Market</li> </ul>	
<p>Ferries / Cargoes</p> 	<ul style="list-style-type: none"> <li>Stabilization Systems</li> <li>Thrusters</li> <li>Steam Turbogenerator sets for on board Energy Saving (THR )</li> </ul>	<ul style="list-style-type: none"> <li>Advanced products</li> <li>Green Package</li> </ul>	
<p>Offshore / Special Vessels</p> 	<ul style="list-style-type: none"> <li>Propulsion (propellers and shaft lines)</li> <li>Retractable azimuthal propellers for propulsion and positioning</li> <li>Thrusters</li> <li>Buoys CALM for loading/unloading products</li> </ul>	<ul style="list-style-type: none"> <li>Diversification</li> </ul>	
<p>Yachts</p> 	<ul style="list-style-type: none"> <li>Propulsion controllable pitch propellers and shaft lines</li> <li>Thrusters</li> <li>Zero Speed fin stabilization systems</li> </ul>	<ul style="list-style-type: none"> <li>Experience and know-how</li> </ul>	

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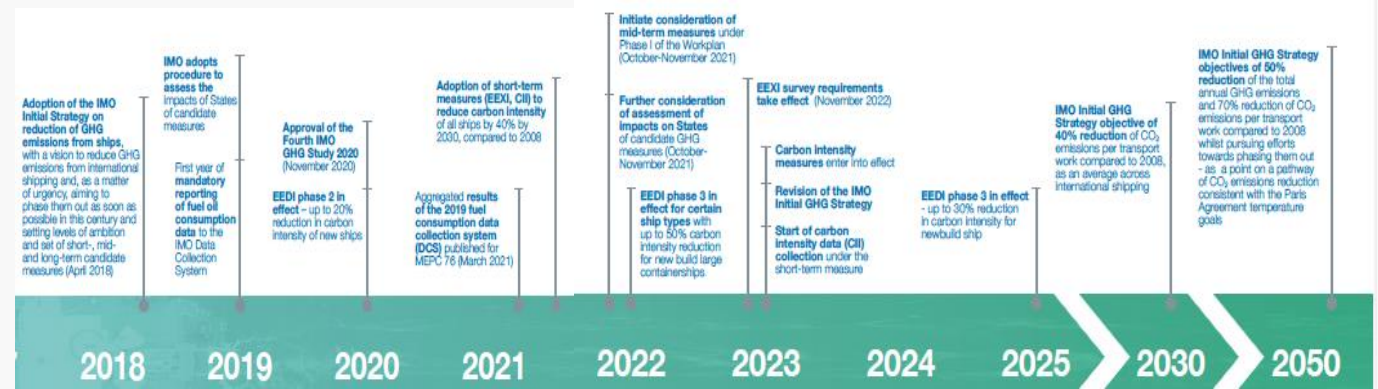
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# Regulatory Framework

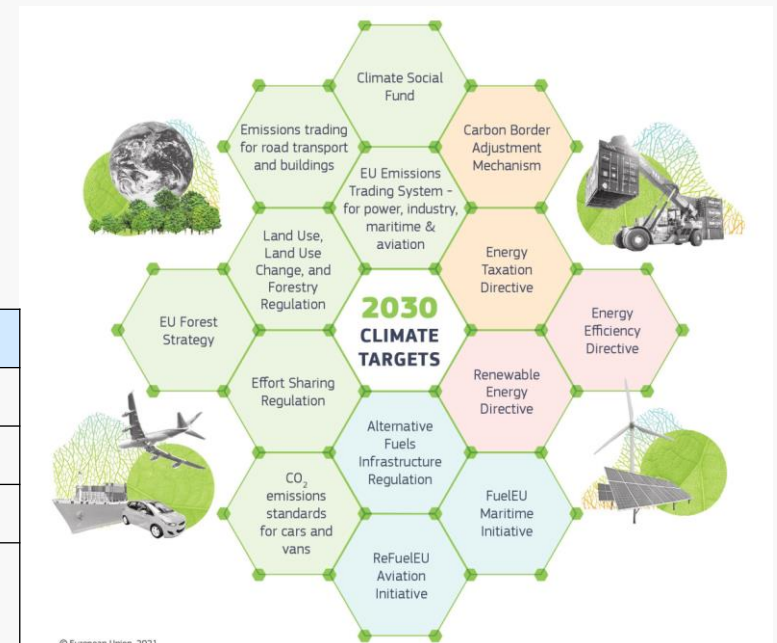
## Decarbonization targets from the International Maritime Organization (IMO):

- -20% CO<sub>2</sub> emissions by 2030 with respect to 2008
- -70% CO<sub>2</sub> emissions by 2040 with respect to 2008
- Net-zero emissions by 2050 with respect to 2008



## Decarbonization targets from the European Commission ('Fit for 55' package):

- -55% CO<sub>2</sub> emissions by 2030 with respect to 1990
- -90% CO<sub>2</sub> emissions by 2050 with respect to 1990



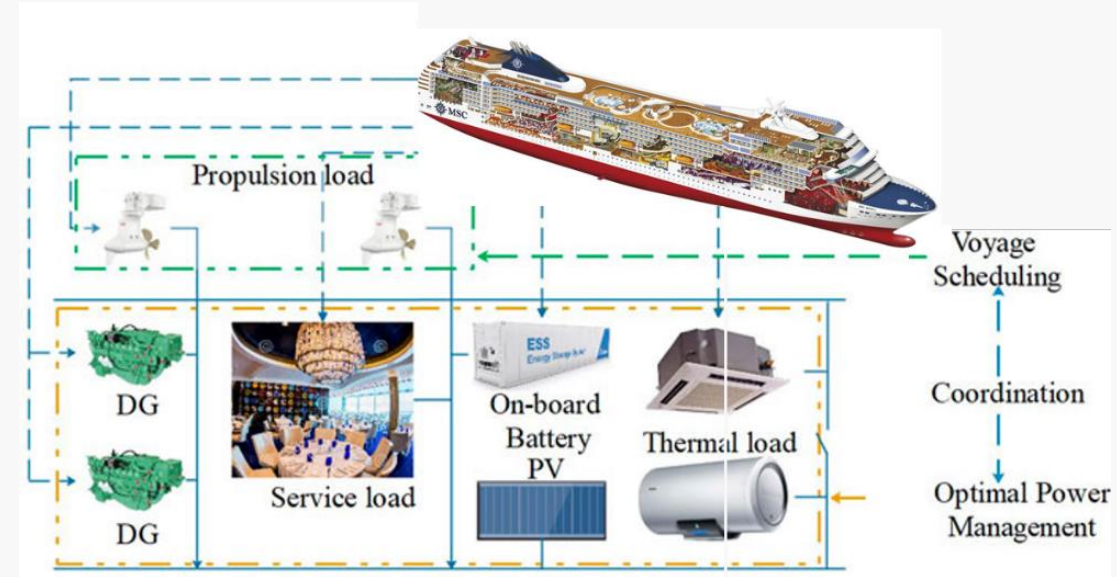
EU DIRECTIVES AND GUIDELINES
Emissions Trading System (ETS) Directive
FuelEU Maritime Initiative
Energy Taxation Directive (ETD)
EU MRV REGULATION Guidance for ships over 5000GT which carry passengers or cargo to, from or between EU/EEA ports, regardless of Flag

# IMO strategy for decarbonization

## PATHWAYS (IMO strategy 2008):

### 01 More efficient energy utilization onboard

- Research to improve efficiency of existing technologies
- Solutions for waste heat recovery (WHR)
- Optimization of ship operating condition (power generation, slow steaming, ...)

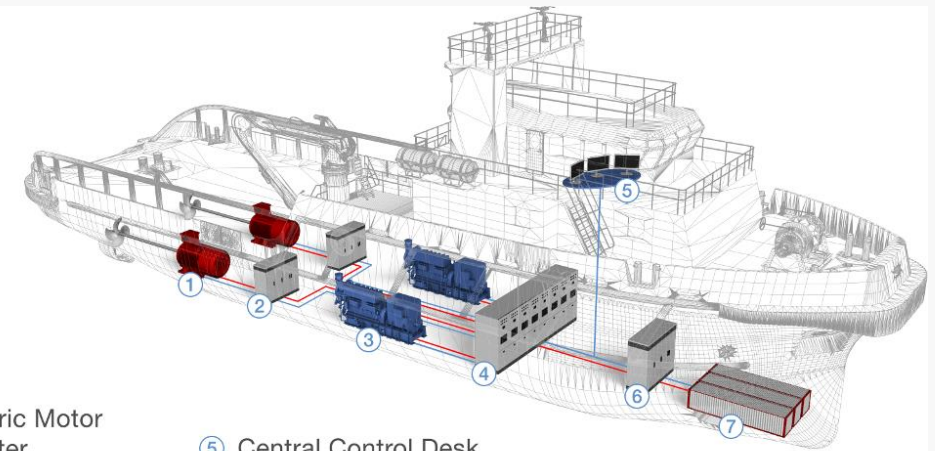
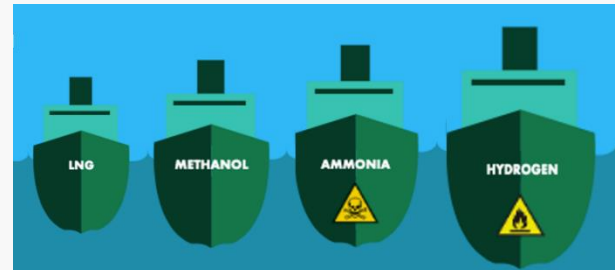


### 02 Innovative and more sustainable solutions

- Alternative fuels (LNG, MeOH, NH<sub>3</sub>, H<sub>2</sub>)
- Hybrid-electric configurations



**SHORT-, MID-TERM SOLUTION**



- ① Electric Motor
- ② Inverter
- ③ Engine-generator
- ④ Switchgear
- ⑤ Central Control Desk
- ⑥ Battery Converter
- ⑦ Battery Storage

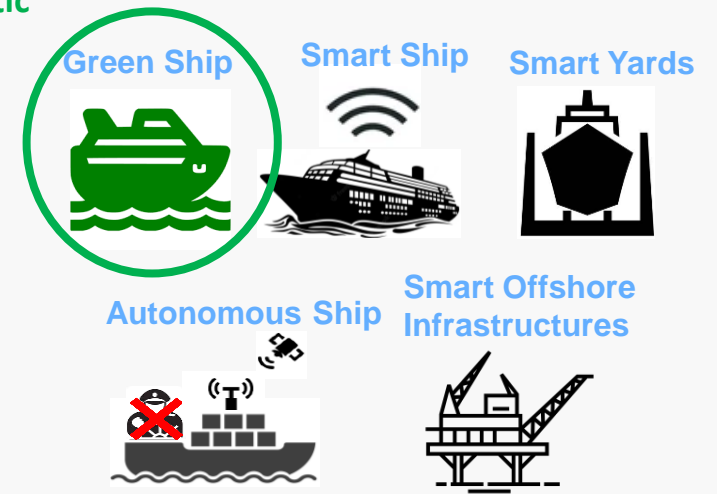
# Our perspective... FINCANTIERI view

Fincantieri Group is committed towards **sustainability** through the development of ecologically sustainable products and services

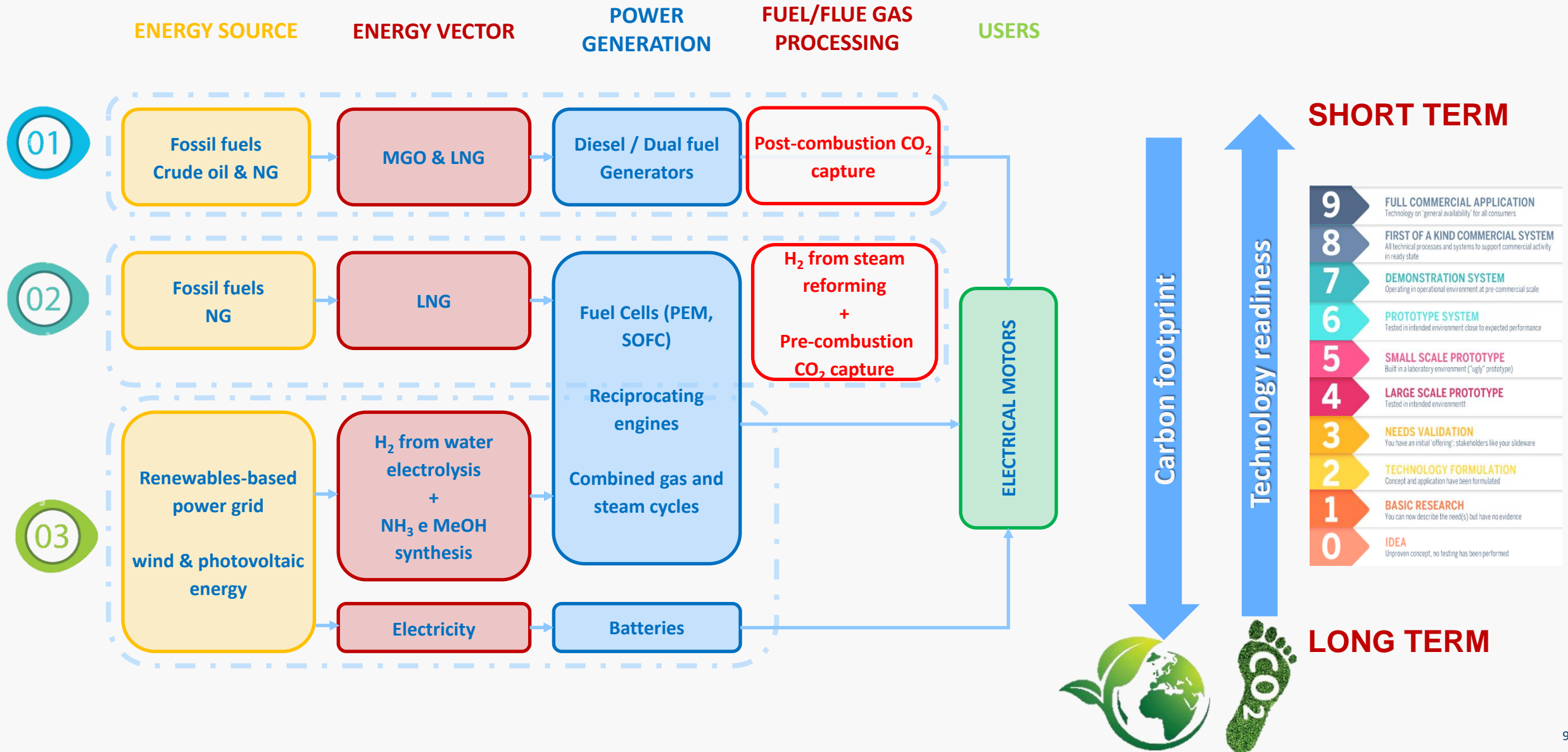


5 core directions of Fincantieri’s Research and Innovation:

- 01 **Green Ships:** sustainability and energy efficiency of ships → Milestone to win the green challenge through a holistic approach
- 02 **Smart Ships:** ship digitalization through Internet of Things (IoT)
- 03 **Autonomous Ships:** ship automation, together with advanced security IT systems
- 04 **Smart Yards:** develop more efficient, safe and sustainable production facilities and processes, thanks to virtual reality, additive manufacturing, robotics
- 05 **Smart Offshore Infrastructures:** introduce innovative solutions for Blue Economy growth (e.g., multi-purpose platforms)



# Our perspective... DSCM view



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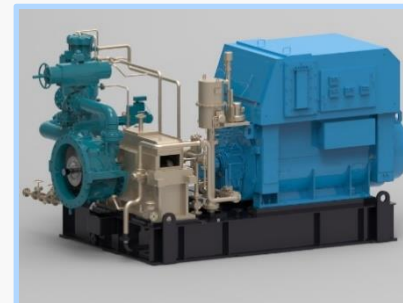
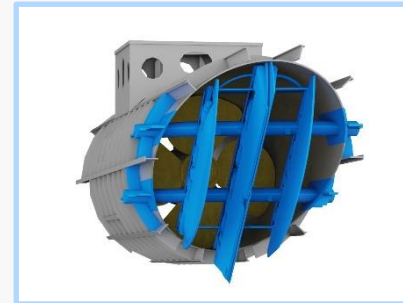
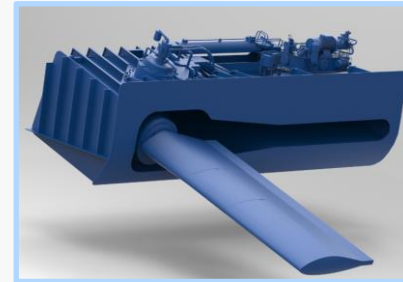
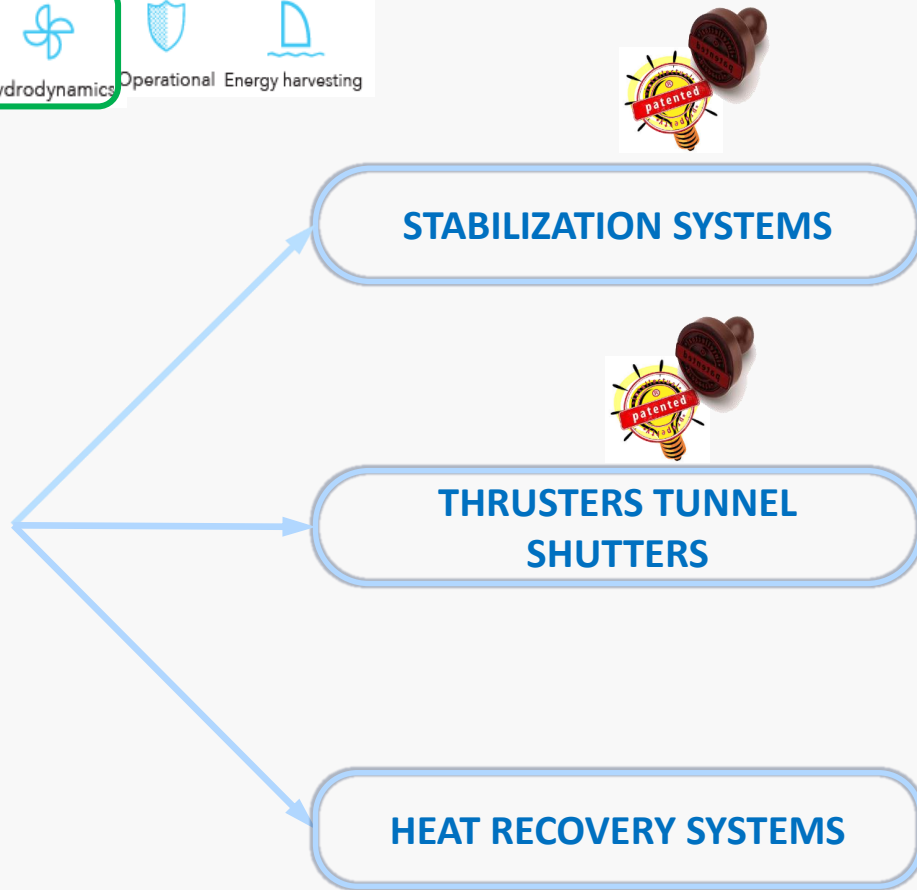
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# Fincantieri DSCM: Our Efforts Towards Decarbonization

today



## GREEN PACKAGE



up to **15% Energy Saving**  
(hull drag & total required propulsion power reduction)

- **Higher efficiency**
- **Emission reduction**
- **Fuel saving**

# Fincantieri DSCM: Our Efforts Towards Decarbonization

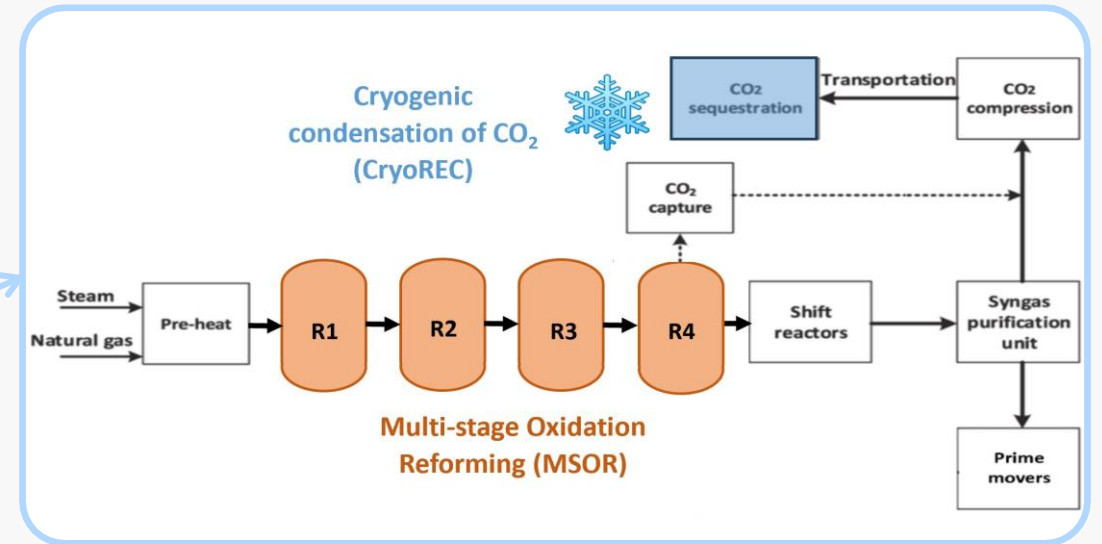
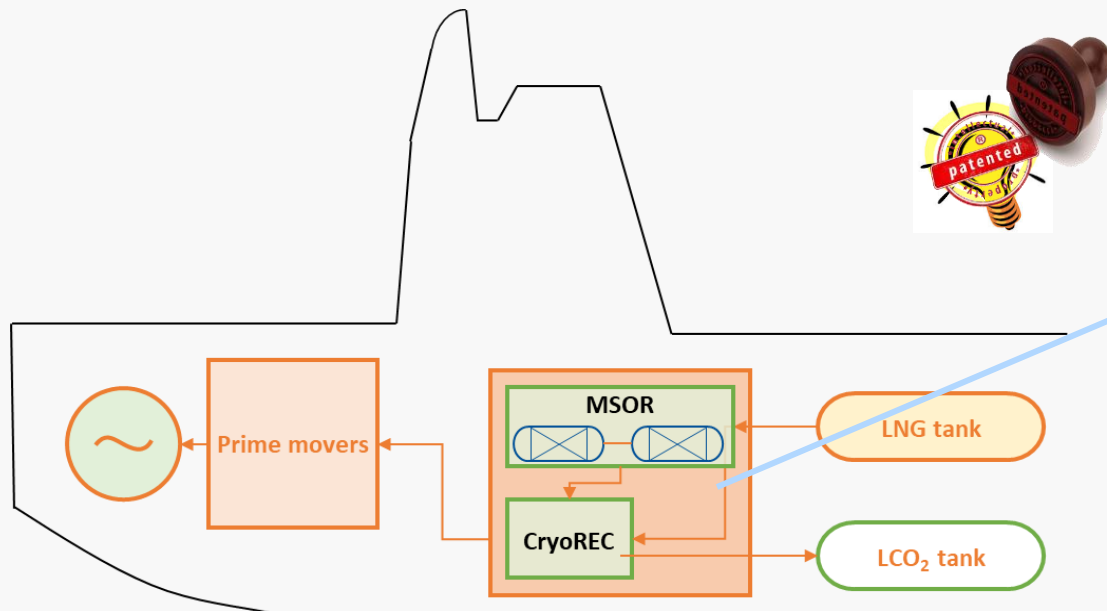


## ShiDEC

Technologies aimed at (blue)  $H_2$  generation onboard:



- Multi-stage Oxidation Reforming (**MSOR**)
- Cryogenic condensation of  $CO_2$  (**CryoREC**) in either pre- or post-combusiton



### Key benefits compared to amines:

- Chemical free process
- Low energy intensive (1/3 energy demand)
- Low space requiring

READY TO MARKET by 2026

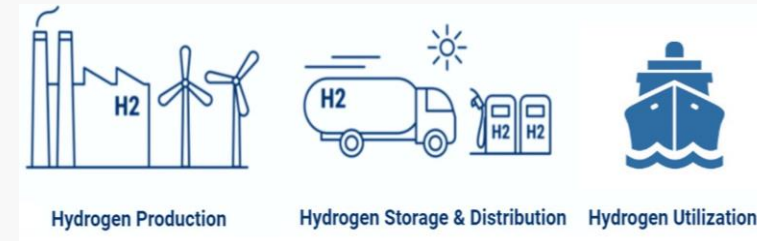
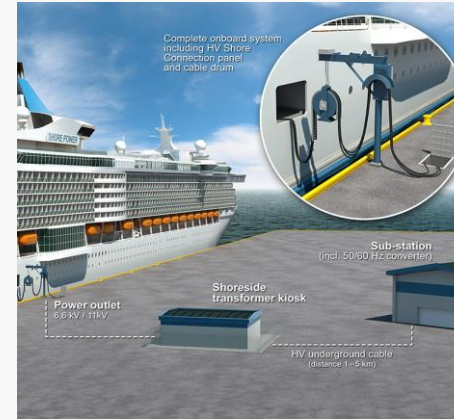
# ShiDEC - Project Impact

**OBJECTIVE:** reduce  $CO_2$  emissions in the **short/mid term**

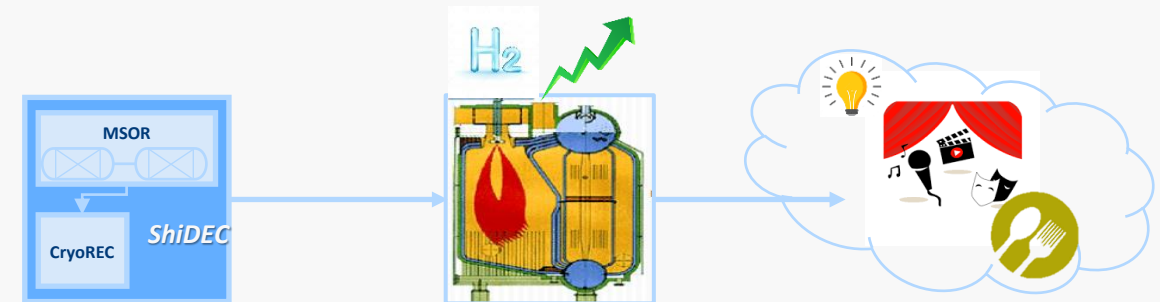
01 Cruise ships dealing with particular operating conditions:

- 1) Stop in **ports** without cold ironing
- 2) **Navigation** in Emission Controlled Areas or areas with particular ecological restrictions

02 Transitional solution towards **Green ships**, while waiting for  $H_2$  infrastructure



ShiDEC benefits
• Reduced CAPEX costs
• Low volumes
• Low weights
• Flexible $CO_2$ abatement (max 90%)
• Suitable for $H_2$ fuel flexibility
• Thermal power recovered by prime movers



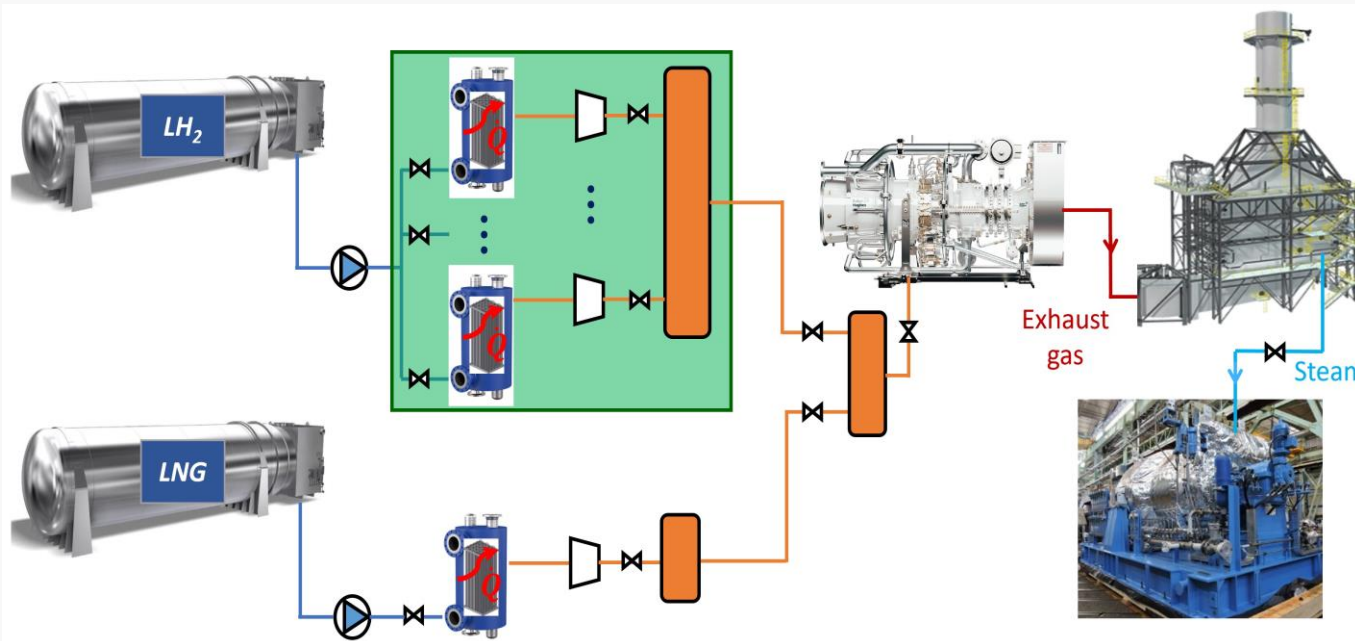
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... the day after



## G-CCGT

H<sub>2</sub> fueled Combined Gas and Steam Turbines Power Plant (10-60 MW)



### 3 Main Topics


- **H<sub>2</sub> handling and blending with various % of LNG**  
→ main challenges fluidic & thermodynamic optimization + regulation & control system
- **Modular Compact Package configuration**  
→ main challenges volume optimization and safety
- **HRS and Steam Power Plant**  
→ main challenge efficiency vs volumes






**TF2**  
**Fuel Cells Technology**

**TF4**  
**End User Technology**

  
**WP1**  
**Development of Hybrid Green Power Generation System (HGPGS)**

  
**WP2**  
**Development of a Green Combined Cycle Gas Turbine fuelled by H2 (G-CCGT)**

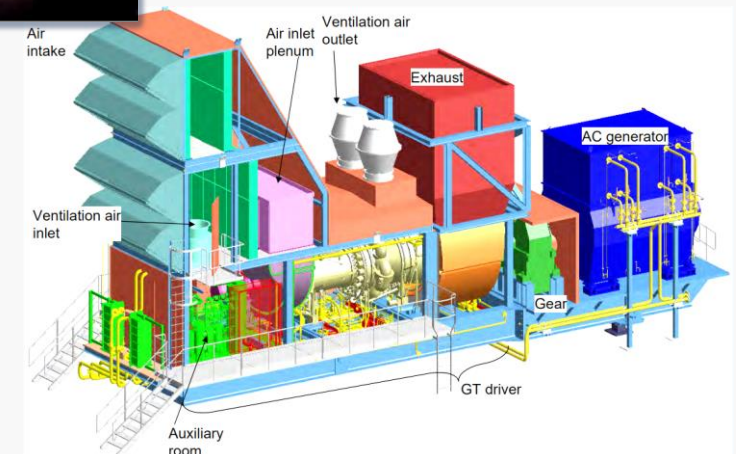
  
**WP3**  
**Integration of Hydrogen-based technologies onboard Green Cruise vessels**



# G-CCGT - Project Impact

**OBJECTIVE:** reduce  $CO_2$  emissions in the **long term**

- 01 Significant **contribution to the long-term energy transition:**
  - 1) **Large-size prime movers** able to run on high  $H_2$  content
  - 2) **Integration onboard** passenger ships
- 02 Some **shipowners** are **already interested** in following technological progress on  $H_2$  step-by-step
- 03 **Leverage know-how of Fincantieri DSCM**
- 04 Applications in **sectors other than the maritime one** will be considered



# Thank You!

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