



GRIMALDI GROUP

The Path to a
Decarbonizing Maritime
Transport

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14th Annual ESPO Conference

1-2 June, 2017 Barcelona



GRIMALDI GROUP



THE GROUP'S HISTORY

The Grimaldi Group began its shipping activity in the late 40's operating through the years in different sectors: passengers, bulk, general cargo, tanker, containers, cars and ro/ro.

After developing in the 60's its maritime services in the Mediterranean, the Group expanded into other areas of the world and further developed the ro/ro concept with increasingly sophisticated and flexible ro/ro multipurpose vessels.

During the last decade the Grimaldi Group made substantial investments in:

- new tonnage;
- logistics platforms;
- trucking companies;
- human resources.

...in order to consolidate its position as a leading ro/ro logistics provider.





THE GROUP TODAY

The Group is today a specialist in the roll on/roll off method of shipment and currently owns one of the largest fleets of ro/ro multipurpose and car carrier vessels in the world.

Worldwide the Grimaldi Group is:

- The 1st deep sea ro/ro operator;
- The 1st short sea ro/ro operator;
- The 1st ro/pax operator for linear meters;
- The 5th vehicle carrier operator;
- The 25th for container transport.

Main awards obtained:

- 2009 Lloyd's List Global Award as best "Cruise & ferry" company
- 1999-2016 FORD Q1 Award
- 2003- 2016 GM Supplier of the year
- 2014 Renault-Nissan Alliance Logistics Europe Best Performance Outbound award
- 2015 Fiat Qualitas Award
- 2016 World Travel Leaders Award
- 2016 Energy Efficiency Award from Rolls Royce
- 2016 Top Logistics Provider- Ocean Carrier category - CNH Industrial

5 BRANDS

GRIMALDI LINES (Italy)



MINOAN LINES (Greece)



FINNLINES (Finland)



ATLANTIC CONTAINER LINE (USA)



MALTA MOTORWAYS OF THE SEA (Malta)





Sustainable and Efficient Vessels to reduce CO2 emissions

Although shipping is recognized as the most efficient form of commercial transport, the enormous scale of the industry (90% of global goods are transported by sea) means that it is nevertheless a significant contributor to the world's total greenhouse gas emission (around 2,5% of total global CO2 emissions).

Shipping companies have already in their DNA a very strong incentive to reduce its CO2 emissions: saving fuel cost.

CO2 emissions are indeed directly proportional by a factor 3 to fuel consumption (the *Conversion factor* for Heavy Fuel Oil As per ISO8217 indicates an emission of 3.11 tons-CO2 at atmosphere every 1 ton-HFO burned) and bunker costs account already for a major share of ship operational expenses and are expected to further increase.



Grimaldi Group environmental philosophy

The Sea as a good alternative to road transportation

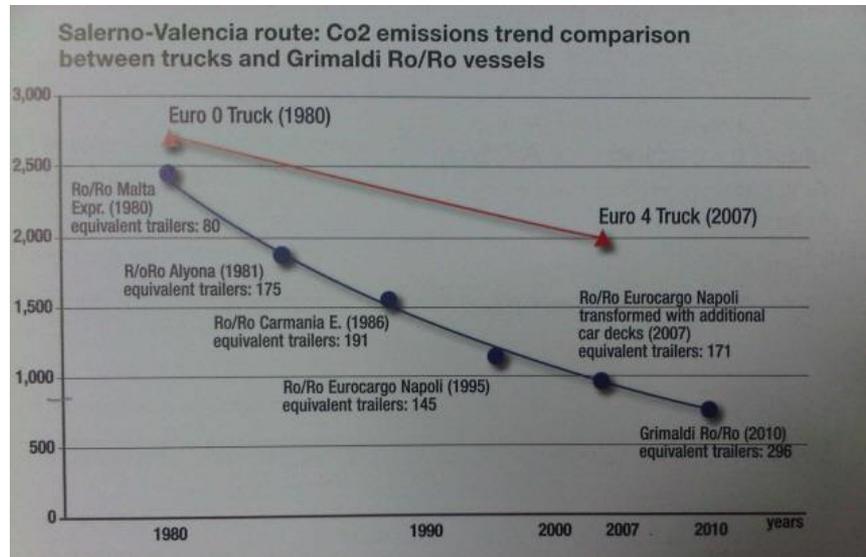


Average emissions in the Sea
Transportation sector is
extremely competitive in terms
of greenhouse gas emissions
against land transportation



Sea transportation against Land transportation

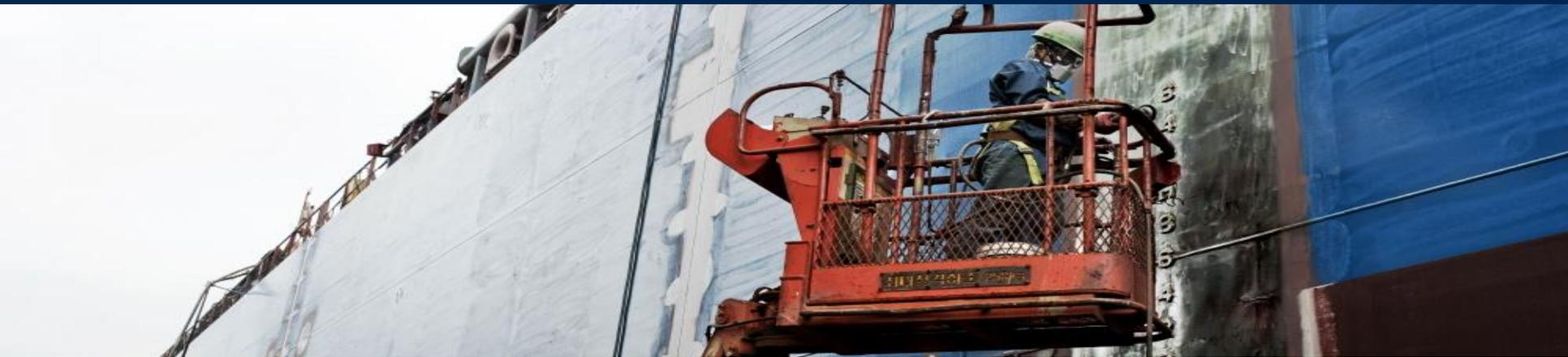
Over the last 30 years CO2 emissions per trailer shipped by sea have gone down by more than 65%.
As example between Salerno and Valencia ships emit one third of CO2 compared to trucks.



As example, the last generation Grimaldi Ro/Ro class of vessels introduced in 2011 is able to load on board each vessel 296 trailer having a CO2 emission level of **752 kg per trailer** compared with **2,003 kg CO2 emission per trailer** achieved by the euro 4 and euro 5 engines mounted in trucks.

Even if the Ship would be loaded only at 60% of his capacity, still Minus 37% on CO2 emissions compared with trucks!





Existing Eurocargo

Name	Built
EC Istanbul	1998
EC Napoli	1995
EC Valencia	1999
EC Salerno	1998

2483 LM

1. Developed keel design
2. Better hydrodynamic
3. More efficient engines
4. increased intake



Technological advancements

New Built Eurocargo

Name	Delivered
EC Genova	2010
EC Malta	2010
EC Alexandria	2010
EC Valencia	2011

3810 LM
+ 53%

Grimaldi Group environmental philosophy

Comparison of consumptions between the two generations Eurocargos

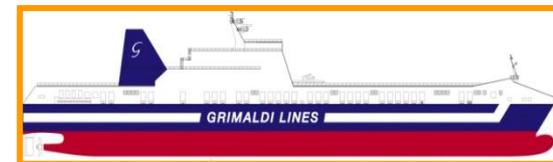
New Eurocargo	Power [kW]	SFOC [gr/kWh]	Knots	Knots>>km	PAYLOAD	LM	gr/ ton km	Consumption/LM [kgfuel day/LM]
	8.355	180	18	1,852	7.129	3.810	6,328	9,473
Old Eurocargo	Power [kW]	SFOC [gr/kWh]	Knots	Knots>>km	PAYLOAD	LM	gr/ ton km	Consumption/LM [kgfuel day/LM]
	11.500	192	18	1,852	6.625	2.355	9,998	22,502
Percentage Improvement							-36,70%	-57,90%

First Hypotesis

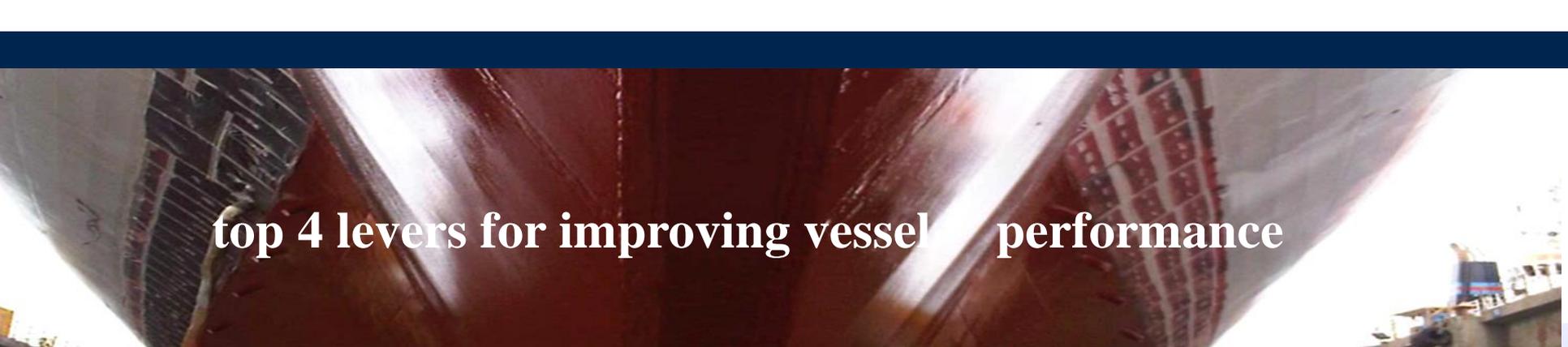
Reduced GrCO2/Ton-Km, considering the same cargo on board

Second Hypotesis

*Reduced KgFuel day/LM, considering the max intakes of both types.
A greater intake allows further margins to improve the unitary performances*



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top 4 levers for improving vessel performance

1. Speed and speed management

Speed has the highest impact on fuel consumption, voyage planning and itinerary are critical up to 15-20% in fuel consumption

2. Hull & propeller degradation

The underwater hull adds resistance over time due to fouling. Higher levels of hull degradation then trigger hull & propeller cleaning decisions or a different type of coating when next in the dry-dock. Doing this in the correct manner very often saves 10-15% in fuel consumption.



3. Main Engine degradation

The third lever is not allowing the main engine to degrade and to keep your SFOC close to the shop test baseline. As this is a standard task for the engineers onboard and the technical superintendents onshore, it is surprising that degradation is often not recognized early enough. Small increases in the SFOC have a big impact. A regular look into deviations of SFOC, TC speed, exhaust gas temperature, scavenge air pressure, Pmax and Pcomb helps. 5-10% of fuel can be saved on many of the vessels we have looked at.

4. Trim and draft

The more vessels are hydrodynamically “optimised”, i.e. have distinct underwater hull shapes, such as bulbous bow or wide transoms, and the more vessels are sailing away from their design conditions (design speed and draft) the more they can benefit from working with trim and draft optimisation in their operations. Only a fraction of vessels work actively with trim and draft optimisation. Trim also falls into 5% saving potential.



New Building Program_focus on:

Impressive reduction of GHG emissions and CO2/cargo x km compared with typical ro-cargo.

Green and silent
PORT Stay, objective
Zero Emissions




GRIMALDI LINES


KNUD E. HANSEN
SHIP DESIGN SINCE 1857



THANK YOU



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