SHAPING OUR GREEN FUTURE

By Xavier LECLERCQ
Vice-President, Owned Fleet
June 25th 2019
CMA CGM, founded 40 years ago by Jacques R. Saadé, is a leading worldwide shipping group.

Now headed by Rodolphe Saadé, CMA CGM enjoys a continuous growth and keeps innovating to offer its customers new maritime, terrestrial, and logistical solutions.
CMA CGM: A GLOBAL PLAYER

MARITIME ACTIVITIES
- CONTAINERSHIPS
- APL
- ANL
- CMA CGM
- CNC
- MERCOSUL LINE
- COMANAV

LOGISTICS
- CEVA

PORTS & SUPPORT
- CMA SHIPS
- CMA TERMINALS
- TERMINAL LINK
CMA CGM GROUP TODAY

20.71 Million TEU transported

1.1 Million TEU with CEVA

2.69 Million TEU of fleet capacity

700+ Offices worldwide

9 million sqm

160 countries

31 Bn revenue in USD

511 Vessels including 193 owned

200+ Shipping lines

110,000+ Staff members worldwide including 8,400 seafarers

45 Terminals in operation

1.1 Million TEU transported

2018 figures

Bn revenue in USD

Vessels including 193 owned

Offices worldwide

Terminals in operation

Million TEU with CEVA

Million TEU of fleet capacity

700+ Offices worldwide

9 million sqm

160 countries

31 Bn revenue in USD

511 Vessels including 193 owned

200+ Shipping lines

110,000+ Staff members worldwide including 8,400 seafarers

45 Terminals in operation
A Worldwide presence...

- 30 OFFICES
  18 PORTS OF CALL
  RIO, NORFOLK, USA

- 34 OFFICES
  43 PORTS OF CALL
  BOS, HAVANA, USA

- 48 OFFICES
  45 PORTS OF CALL
  RIO, SAO PAULO, BRAZIL

- 162 OFFICES
  116 PORTS OF CALL
  HEAD OFFICE: MARSEILLE, FRANCE

- 250 OFFICES
  68 PORTS OF CALL
  HEAD OFFICE: SEOUL, KOREA, CHINA

- 13 OFFICES
  21 PORTS OF CALL
  RIO, DURBAN, S. AFRICA

- 94 OFFICES
  80 PORTS OF CALL
  RIO, DUBAI, UAE

- CMA CGM
  WORLDWIDE SHIPPER
  ENVIRONMENT
Environment is an integral part of our sustainable journey

3 Strategic Axis

AIR
Energy & Climate
Air Emissions

OCEAN
Marine Environment
Biodiversity

INNOVATION
Eco-Solutions
Sustainable Transport
A pioneer group in environmental commitment

- In April 2018, IMO (International Maritime Organization) adopted strategy for further reduction of CO2 by the shipping industry – by 50 percent by 2050;
- The CMA CGM Group has improved its carbon efficiency by 50% between 2005 and 2015;
- An ambitious goal of an additional 30% reduction between 2015 and 2025;
Leading the climate change agenda

- Achieved: -50% per teu-km, 2005-2015
- New Target: -30% per teu, 2015-2025

An ambitious carbon target

Historic member of the Clean Cargo Group

Premium carbon solutions and services
A carbon footprint among the best in the industry with the new ships

- A wide range of volume capacities
- A young fleet becoming more environmentally friendly
- From 62g to 25g CO2/TEU/Km
- Containershipping is more than ever the cleanest mode of transport
SHAPING OUR GREEN FUTURE… 2009 - 2018
10 years of innovations to reduce our impact on air and water
## Solution to meet the challenge: Evaluating risks

<table>
<thead>
<tr>
<th>Low Sulfur Marine Fuel</th>
<th>Scrubber (Open &amp; Closed loop)</th>
<th>LNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Easy to implement</td>
<td>• Alternative solution to be compliant</td>
<td>• Alternative solution to be compliant</td>
</tr>
<tr>
<td>• Adapted to the current regulation</td>
<td></td>
<td>• Innovative solution, technological break</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Proactive solution considering other regulations: CO2 (-10 à -25 %), NOX (-85 %), PM (-99%)</td>
</tr>
<tr>
<td>• Inadequate solution on mid/long term considering other regulations (CO2, Nox or PM)</td>
<td>• Inadequate solution on mid/long term considering other regulations (CO2, Nox or PM) with more constraints to be compliant</td>
<td>• Processes and standards are being developed</td>
</tr>
<tr>
<td></td>
<td>• More elevated risks of controls, operational constraints regarding wastes</td>
<td>• Methane emissions (unknown quantities but its heat capacity is 20 times higher than CO2.</td>
</tr>
<tr>
<td></td>
<td>• open loop: impact on the environment, risk for your reputation</td>
<td>• Technological risk</td>
</tr>
<tr>
<td></td>
<td>• + 2% CO2 emissions vs low sulfur fuel—increased fuel consumption</td>
<td></td>
</tr>
</tbody>
</table>
SHAPING OUR GREEN FUTURE... 2019 – 2022...

2019
- Scrubbers phase 1 (20)
- BioFuel test
- New paint strategy

2020
- 7 x 22,000 LNG vessels (7)
- Fuel Sulphur Cap

2021-2022
- 2 x 22,000
- 5 x 15,000 LNG vessels (26)
- Scrubbers phase 3

PERFORMANCE
LNG market: A fast growing competitive market

- 70 to 150 years of gas reserves
- LNG is a fast growing market evaluated at 350 Mt 2020 ~ 10% world gas consumption (+4-5%/y)
- Today bulk gas is cheaper than gasoil and heavy fuel oil on an energy parity basis

Source: NYMEX, ICE, Platts
SHAPING OUR GREEN FUTURE... 2019 – 2022...
LNG as FUEL ships are developing

Source: DNV-GL, Alternative Fuels Initiative website
LNG Bunkering infrastructure is developing....
LNG BUNKER VESSELS are developing

<table>
<thead>
<tr>
<th>Order</th>
<th>Owner</th>
<th>Name</th>
<th>Size (cbm)</th>
<th>Containment</th>
<th>Status</th>
<th>Operational area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Seagas</td>
<td>Seagas</td>
<td>1x180</td>
<td>Type C Tank</td>
<td>Built 2013 conversion</td>
<td>Baltic</td>
<td>DNVGL</td>
</tr>
<tr>
<td>2014</td>
<td>NYK Lines</td>
<td>Engie Zeebrugge</td>
<td>1x5,100</td>
<td>Type C tank</td>
<td>Built 2017</td>
<td>Europe</td>
<td>BV</td>
</tr>
<tr>
<td>2014</td>
<td>Shell</td>
<td>Cardissa</td>
<td>1x6,500</td>
<td>Type C tank</td>
<td>Built 2017</td>
<td>Europe</td>
<td>BV</td>
</tr>
<tr>
<td>2014</td>
<td>Sirius</td>
<td>Corallus</td>
<td>1x5,800</td>
<td>Type C tank</td>
<td>Built 2017</td>
<td>Europe</td>
<td>BV</td>
</tr>
<tr>
<td>2016</td>
<td>Schulte Group</td>
<td>Kairos</td>
<td>1x7,500</td>
<td>Type C tank</td>
<td>Built 2018</td>
<td>Europe</td>
<td>LR</td>
</tr>
<tr>
<td>2017</td>
<td>Itsas Gas Bunker</td>
<td>Oizmendi</td>
<td>1x600</td>
<td>Type C tank</td>
<td>Built 2018</td>
<td>Spain</td>
<td>BV</td>
</tr>
<tr>
<td>2016</td>
<td>JAX</td>
<td>Clean Jacksonville</td>
<td>1x2,200</td>
<td>Membrane Mark III</td>
<td>Built 2018 Barge at USA</td>
<td>USA</td>
<td>ABS</td>
</tr>
<tr>
<td>2017</td>
<td>Titan LNG</td>
<td>FlexFueler1</td>
<td>1x760</td>
<td>Type C tank, barge</td>
<td>Built 2018 Barge</td>
<td>Europe</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>Stolt Nilsen</td>
<td></td>
<td>3x7,500</td>
<td>Type C tank</td>
<td>Keppel Nantong, 2019 1st</td>
<td>TBD</td>
<td>DNVGL</td>
</tr>
<tr>
<td>2017</td>
<td>Korea Line</td>
<td></td>
<td>2x7,500</td>
<td>Membrane KC-1</td>
<td>Samsung, 2019</td>
<td>Korea</td>
<td>KR</td>
</tr>
<tr>
<td>2017</td>
<td>Shell</td>
<td></td>
<td>1x3,000</td>
<td>Type C tank, barge</td>
<td>Victrol/CFT, 2019</td>
<td>Europe</td>
<td></td>
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<tr>
<td>2018</td>
<td>Total/MOL</td>
<td></td>
<td>1x18,600</td>
<td>Membrane Mark III</td>
<td>Hudong, 2020</td>
<td>TBD, Europe</td>
<td>BV</td>
</tr>
<tr>
<td>2018</td>
<td>Q-LNG</td>
<td></td>
<td>1x4,000</td>
<td>Type C tank, ABT barge</td>
<td>USA, 2019</td>
<td>USA</td>
<td>ABS</td>
</tr>
<tr>
<td>2018</td>
<td>FueLNG (SNG)</td>
<td></td>
<td>1x7,500</td>
<td>Type C tank</td>
<td>Keppel Nantong, 2020</td>
<td>Singapore</td>
<td>ABS</td>
</tr>
<tr>
<td>2018</td>
<td>ENN (China)</td>
<td></td>
<td>1+1x8,500</td>
<td>Type C tank</td>
<td>DSIC, 2020</td>
<td>China</td>
<td>CCS</td>
</tr>
<tr>
<td>2018</td>
<td>CLS Japan</td>
<td></td>
<td>1x3,500</td>
<td>Type C tank</td>
<td>KHI, 2020</td>
<td>Japan</td>
<td>NK</td>
</tr>
<tr>
<td>2019</td>
<td>Stolt</td>
<td></td>
<td>2x20,000</td>
<td>Type C tank</td>
<td>SOE+SDARI design</td>
<td>TBD</td>
<td>DNVGL</td>
</tr>
<tr>
<td>2019</td>
<td>MOL (Pavillon)</td>
<td></td>
<td>12,000</td>
<td>Membrane Mark III</td>
<td>Sembcorp, 2021</td>
<td>Singapore</td>
<td>BV</td>
</tr>
<tr>
<td>2019</td>
<td>Ecobunker</td>
<td></td>
<td>1x2500</td>
<td>SPB Type B tank</td>
<td>JMU, 2021</td>
<td>Japan</td>
<td>NK</td>
</tr>
<tr>
<td>2019</td>
<td>CNOOC GasPower</td>
<td></td>
<td>1x6,000</td>
<td>Type C tank</td>
<td>2021/2022</td>
<td>China</td>
<td>CCS</td>
</tr>
</tbody>
</table>

20 LNG bunkering vessels on order with LNG capacity from 180 m^3 to 20 000 m^3

Source: DNV-GL
Benefits of DUAL FUEL vessels

ME 2 strokes Low pressure technology (WINGD) design has been selected over high pressure:

- Compliant with NOX tier III in gas mode
- Less risk with low pressure
- Less equipment, and « easier » management of LNG supply

<table>
<thead>
<tr>
<th></th>
<th>Low pressure</th>
<th>High Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>-25%</td>
<td>-23%</td>
</tr>
<tr>
<td>NOx</td>
<td>-85% =&gt; Tier III</td>
<td>-13% =&gt; Tier II only</td>
</tr>
<tr>
<td>SOx</td>
<td>-99%</td>
<td>-92%</td>
</tr>
<tr>
<td>PM</td>
<td>-99%</td>
<td>-37%</td>
</tr>
<tr>
<td></td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>
1 400 WENCHONG – Vessel Presentation

**Main Engine**
- WINGD 7RTFLEX 50DF MCR 10 080 kW @ 124 RPM
- HFO spec (ME/Aux. Eng./Boiler) 700/700/700xSt SG01
- Propeller type: CPP 4 Blades
- Row / stem thruster: 020 / 720 kW

**Fuel Oil Consumption of Main Engine**
- L.C.V. = 10,200 kcal/kg
- D.F.O at NCR: 35 MT / day of LNG + 1MT / day of MGO
- cruising range: 3 200 NM on LNG / 6 500 NM on fuel

**Power Supply**
- Diesel Generators: 1* 1110 +3* 620 kW
- Shaft generator: 1800 kW
- Emergency Generator: kW

**Contiguous Technologies**
- Bow & Stern Thruster

**Vessel Capabilities**
- With max. number of Containers: 844 TEU
- IMO visibility guideline: 536 TEU
- On deck (6 tiers): 1 380 TEU
- Total: 844 TEU
- Rows max. in holds / on hatches: 9 / 10 Rows
- Tiers max. in holds / on hatches: 5 / 6 Tiers
- EL. Plugs (for reeler Container): 372 FEU
- Total: 372 FEU
- Stability (xx t/TEU, hetero at Ts): xxx TEU
- Stability (14 t/TEU homo. at Ts): 1 120 TEU
- (based on 8ft Sinches, 45% Container VOQ)

**Navigation Equipment**
- 2 consoles Radar Plant with ARPA
- 1 - ECDIS
- 1 - Auto Pilot / 1 Gyro compass
- 1 - DGPS navigator + 1 DGPS
- nd 1 echo sounders

**Complement**
- Crew of 19 persons

**Remark**
- Only one aux engines is DF, 3 other aux engines run on MDO
- Shaft generator
4 vessels were ordered by CONTAINERSHIPS. Further to acquisition by CMA CGM, 2 additional vessels were ordered. First 2 vessels (CONTAINERSHIPS NORD & CONTAINERSHIPS POLAR) are delivered. Next vessel to be delivered in July 2019: CONTAINERSHIPS AURORA.

3 months after delivery, the LNG consumption ratio is stabilized above 85%.
22000 TEU Project

- Tank Capacity of 18,600 m³
- Dimensions:
  - 61.3 meter-large
  - 399.9 meter-long
- 22,000 EVP
- Shipyard: China State Shipbuilding Corporation
  - Trading House: CSTC
  - Design institute: MARIC
  - Yards: Jiangnan Heavy Industries and Hudong Heavy Industries
- Engine: WINGD 12X92DF
- LNG tank: GTT Mark III
- Class: Bureau Véritas

- The result of a 7 years R&D project in cooperation with shipyards, engine makers, ports and many other partners
- A technology we will apply on 22,000 TEUs containerships for the **first time in the history** of the shipping industry
22 000 CSSC – Vessels presentation

CMA CGM NEWBUILDING 22 000 Teus DUAL FUEL
CSSC – HZ & JN
EEDI : 7.47 under HFO, 5.86 under LNG

MAIN PARTICULARS
Length over all: 399.9 m
Length between perp: 399.9 m
Breadth: 61.3 m
Depth: 33.5 m
Draught, design: 14.5 m
Draught, scantling: 16 m
Air draught: 75 m
Deadweight on Td: 194 400 Ton
Lightship weight: 218 819 Ton
Service Speed: 21.55 knots
SWBM: 1 436 000 t

CLASS : BV
1, 2Hull, 3Mach, Container Ship, DUAL FUEL
Unrestricted Navigation, VERISTAR HULL FAT 25,
MCS, Monohull, In Water Survey, GPS (BW
CLEANSHIP, GREENPASSPORT EU, AUT-Po
Lashing WW, LI-HG-S2, ESA, +ALP, SDS

MAIN ENGINE
WINGD: 12X92 DF
MCR: 63 840(kW) @ 80 RPM
HFO spec (ME/Aux. Eng./Boiler): 700/700/700kW
DF fuel pipe: 5 Blades
Fuel oil consumption:
(D.C.Y=42 700 kJ/kg)
D.F.G at NCR: 192 MTD
DFOC at NCR: 239 MTD
Cruising range: 21 000 NM

POWER SUPPLY
Diesel Generators: 2x Wartsila 9L34DF 4320 kW
4x Wartsila 8L46DF 3840 kW

VENNEL CAPACITIES
With max. number of Containers
IMO visibility guideline
On deck (12 tiers): 13 328 TEU
In hold: 9 784 TEU
Total: 23 112 TEU
Rows max. in holds/on hatches: 22 / 24 Rows
Tiers max. in holds/on hatches: 12 / 12 Tiers
EL Plugs (for reefer Container)
On Deck: 1 400 FEU
In Hold: 800 FEU
Total: 2 200 FEU
Stability (9 t/TEU, hetero at Ts): 20900 TEU
Stability (14 t/TEU homo. at Ts): 14530 TEU
(based on 8 ft/niches, 45% Container VCG

NAVIGATION EQUIPMENT
1 – Multipurpose consoles Radar Plant with ARPA
1 - ECDIS/ conning
2 - Auto Pilot / 2 Gyro compass
2 - DGPS navigator
1 speed log single axis, 1 speed log triple axis and
2 echo sounders

TONNAGE:
GT: 237 200
Suez GT: xxx
Suez NT: xxx

COMPLEMENT
Crew of 40 p + 7 Suez crew

6 aux engines DF (2 larges and 4
smallers)
22 000 CSSC – Hull Optimization

✓ Hull form have been optimized.
✓ New shape of forward part with vertical bow.
22 000 CSSC – Vessels presentation – Construction status

✓ Steel cutting done for 8 vessels
✓ Keel laying done for 4 vessels
15 000 CSSC – Vessels presentation

**CMA CGM NEWBUILDING 15 000 DF**

**CSSC**

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**MAIN PARTICULARS**
- Length over all: 366 m
- Length between perp: 360.5 m
- Breadth: 51.2 m
- Depth: 30.2 m
- Draught, design: 14 m
- Draught, scantling: 15.5 m
- Air draft: 87.5 m
- Deadweight on Td: 128 000 Ton
- Deadweight on Ts: 152 000 Ton
- Light weight: xxxx Ton
- Service Speed: 22.0 Ton
- (Ts, 90%CMR, 15% Sea Margin)
- SWBM: 8 900 000 kN.m

**CLASS : BV**

**TANK CAPACITIES**
- Heavy fuel oil: 2500 m³
- Marine diesel oil: 1600 m³
- Lubricating oil: 500 m³
- Fresh water: 500 m³
- LNO: 14 000 m³
- Ballast water: 40 000 m³

**MAIN ENGINE**
- WINGO: 10X02DF
- MCR / SMCR: 53 200 kW / 49 000 kW @ 60 / 76 RPM
- D.F.G.C at NQR: 148 MT / day
- D.F.O at NQR: 185 1 MT / day
- Cruising range: 20 000 NM

**POWER SUPPLY**
- Diesel Generators: 4 * 4150 + 1 * 2600 kW
- Emergency Generator: 340 kW

**CARGO HATCH COVER**
- Type: Steel pontoon type
- Stack weight: Class weight,
- Panel weight: Class weight

**VEssel CAPACITIES**
- With max number of Container
- On deck (11 tiers): 9488 TEU
- In hold: 6050 TEU
- Total: 15 008 TEU
- Rows max. in holds/on hatches: 18 / 20 Rows
- Tiers max. in holds/on hatches: 11 / 11 Tiers
- El. Plugs (for reefer Container)
- On deck: 1 400 FEU
- In hold: 400 FEU
- Total: 1 800 FEU

**NAVIGAT**
- 4 – Multipurpose
- 1 – ECDIS / cc
- 1 – Auto Pilot
- 2 – DGPS navigator
- 1 speed log single axis, 1 triple axis speed log and 2 echo sounders

**Tonnage**
- GT: xxxx
- NT: xxxx

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**Environement**

- 15 000 teus, 11 tiers on deck
- 1800 reefer plugs (1400 on deck and 400 in hold)
- 5 aux engines DF
15 000 CSSC – Vessels optimization

Hull form optimization completed.

Performance optimization will continue
THANK YOU FOR YOUR ATTENTION
Simops with LNG Bunker Vessel

Alternatives Energies for the future

Ludovic Gérard – April 23, 2018