Competitive Dynamics for Carriers: Competition and Cooperation in the Container Market

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Three Dramatic Mega Trade Trends will Increase Global Trade Demand
Current Market Conditions Appear to be Improving for Marine Carriers

Expect the Global Maritime Trade Volume to Double by 2030...

Source: JOC.COM January 2018
Expect the Global Maritime Trade Volume to Double by 2030

“In the next 10-15 years world trade is projected to grow significantly. It is estimated that this growth will result in a doubling of seaborne trade volumes from 10 billion tons of cargo annually today to 20 billion tons of cargo around 2030”.

Source: Danish Maritime Forum, 24-28 October 2016
I. INCREASE IN GLOBAL POPULATION:

Global population is likely to be 8.5 billion by 2030, with 96% of growth coming from developing countries.

India will overtake China with the largest population.

Source: Global Marine Trends 2030 – QinetiQ – Lloyd’s Register
Top Global Bilateral Trade Connections:

**2030:**
8.5 Billion (Sino Centric)

**2010:**
6.9 Billion (Western Centric)

Source: Global Marine Trends 2030 – QinetiQ – Lloyd’s Register
II. GLOBAL GDP COULD GROW THREE TIMES WITHIN THE NEXT 20 YEARS

The countries with the largest growth in per capita GDP will be China, Vietnam, India and Indonesia.

Purchasing power in developing Asia will rise 8 times between 2010 and 2030.

Source: Global Marine Trends 2030 – QinetiQ – Lloyd’s Register
III. 40% HIGHER ENERGY DEMAND IN 2030

China oil consumption could triple, overtaking the USA to become the largest oil consumer.

The USA will remain the biggest natural gas consumer, while China will see the largest growth in natural gas consumption.

Source: Global Marine Trends 2030 – QinetiQ – Lloyd’s Register
The Evolution of Today’s Global Shipping Lanes
The Maritime Silk Road Replaced the Overland Silk Road as the Primary Trading Route Across Eurasia After the Tang Dynasties (618 to 907)
The Marine Silk Road was a Precursor to:

Today’s modern supply chain logistics, distribution and shipping transportation networks
90% of Global Trade is Carried Out by Shipping

The Majority of Today’s Ocean Trade is Conducted on the Marine Silk Road
The World’s Primary Shipping Route: The Marine Silk Road
Maersk’s Global Trading Routes Today
Indian Ocean Electric Blue Shipping Lane Trails From the Marine Silk Road
The World's Largest Ports Are Connected Via The Marine Silk Road

Where are the Biggest Ports?
The world's largest ports are connected inside the Marine Silk Road circle.
A standard dot density map of population (each dot represents 50,000 people).
Global Shipping Routes Plotted by AIS GPS

Today’s Busiest Shipping Routes:
(1) Panama Canal, (2) Suez Canal, (3) Offshore China

International
External Industry
Pressures Driving
Today's Logistics
More than 98% of everything we consume, wear, eat, drive and construct is brought to us via ships through the North American port system.
Growth in GDP and World Trade

World trade will grow by 73% in the next 15 years. With merchandise trade volumes in 2025 hitting $43.6 trillion compared to today’s $27.2 trillion.
World Trade’s Share of the Economy Grows Again

Globalization trend is shifting, not reversing, long-term.

(World imports, percent of GDP)

% INCR = 37%

Source: IHS Global Insight – World Trade Service
Long Term GDP Annual Growth Rates

Source: OECD Economic Forecast
International Maritime Cargo Demand & Logistics Trends
2025 World Container Port Market Demand
(Millions of TEUs)

10% CAGR from 1990 - 2008
(9.1%) global volume loss for 2009
Recovery in 2010 with 14.8% growth
50% projected rise 2009-2015

Source: Drewry Shipping Consultants
With Manufacturing Centroid Shifts Into Vietnam and/or India, The North American East Coast will See Dramatically More Westbound Suez Traffic
Suez Canal’s $8.5 Billion Expansion Plan
(A New $4 Billion 45-mile-long parallel channel and Global Logistics Park)

3 Daily Convoys:
2 Northern Convoys
1 Southern Convoy
The Suez Canal’s $8.5 Billion Expansion of the Canal
Completed September 2015

New 45-mile-long parallel channel cutting waiting times to transit by 3 hrs. from 11 hrs.
Dredging 180 Million Cubic Meters (35-kilometers-long and 24-meters-deep) Shipping Route in Less than One Year
Egyptian Jet Fighter Escort Selfie
(Taken with the New Expanded Suez Canal in the Background)

Source: Photo Courtesy of MIRASCO, August 2015
The Number of Ships Able to Navigate the Suez Canal Simultaneously Has Increased from 23 to 97, **Doubling the Suez Canal Capacity by 2023**
The Arrival of Mega Container Ships in North America
(The Advent of Ultra Large Container Vessels (ULCV) – Megamax MGX 24 Vessel)
Size of container ships has been growing at a faster pace than all other ship types.

Source: Clarkson Services – OECD/ITF 2015 Project: Impact of Mega Ships
OECD Historical Development of Container Vessel Size (1970 to 2017)

Source: Clarkson Services – OECD/ITF 2015 Project: Impact of Mega Ships
Future Development “Extrapolated” OECD Container Vessel Size (2015 to 2035)

Source: Clarkson Services – OECD/ITF 2015 Project: Impact of Mega Ships
Panama Canal Third Lane Expansion Capabilities

Neo-Panamax: 12,600 TEUs

Length of Post-Panamax Vessel: 366m

Post-Panamax
Draft: 15m

Old Panamax: 4,800 TEUs

Length of Panamax Vessel: 294m

Panamax
Draft: 12m

Source: ACP Expansion Project, Circle of Blue January 27, 2015
Largest NEO-PANAMAX Containership to Transit the New Panama Canal – August 2017
(OCEAN Alliance’s weekly South Atlantic Express (SAX) service)

CMA CGM’s THEODORE ROOSEVELT:
- TEU Allowance: 14,855 TEUs
- Vessel LOA: 365.9 meters (1,200.66 ft.)
- Vessel Beam: 48.2 meters (158.31 ft.)
- Vessel Max. Draft: 16 meters (52.49 ft.)
40 Years of Container Ship Size Growth
(TEU Capacity)

Source: HIS Maritime & Trade Historical Vessel and Orderbook Data
50 Years of Container Vessel Evolutionary Growth

- **1968**: Encounter Bay 1,530 teu
- **1972**: Hamburg Express 2,950 teu
- **1980**: Neptune Garnet 4,100 teu
- **1984**: American New York 4,600 teu
- **1996**: Regina Maersk 6,400 teu
- **1997**: Susan Maersk 8,000+ teu
- **2002**: Charlotte Maersk 8,890 teu
- **2003**: Anna Maersk 9,000+ teu
- **2005**: Gjertrud Maersk 10,000+ teu
- **2006**: Emma Maersk 11,000+ teu
- **2012**: Maersk Mc-Kinney Møller 18,270 teu
- **2013**:
- **2014/2015**: CSCL Globe/MSC Oscar 19,000+ teu
- **2018**: Near Term Mega Vessel: 24,000 TEUs

Old Panamax: 4,800 TEUs
Neo-Panamax: 14,800 TEUs

Container-carrying capacity has increased by approximately 1,200% since 1968.

Source: Allianz Global Corporate & Specialty - Data: Container-Transportation.com
The Recent Mega Container Vessels are Too Large for the New Panama Canal Third Lane Expansion

**EARLY CONTAINER SHIP**
- 17 meters wide
- 137 m long
- 9 m draft
- 800 containers

**MAXIMUM SHIP SIZE, EXISTING LOCKS**
- 32.3 m wide
- 294.1 m long
- 12 m draft
- 4,500 containers

**MAXIMUM SHIP SIZE, NEW LOCKS**
- 49 m wide
- 366 m long
- 15.2 m draft
- 12,500 containers

**THE LARGEST CONTAINER SHIP, MAERSK’S TRIPLE E**
- 59 m wide
- 400 m long
- 14.5 m draft
- 18,000 containers

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**EXISTING LOCKS**
- 33.5 m wide / 12.8 m deep / 304.8 m long

**NEW LOCKS**
- 55 m wide / 18.3 m deep / 427 m long

Source: A.P. Moeller-Maersk, Panama Canal Authority
May 8, 2017 Largest Container Vessel to Call at the Port of Virginia

Cosco Development Container Ship – 13,092 TEUs

Containership COSCO DEVELOPMENT at 1,200 feet long and 158 feet wide, it is 100-plus feet longer than the U.S. Navy's newest aircraft carrier the Gerald R. Ford.
The Biggest Ship Ever in San Francisco Bay
CMA CGM Benjamin Franklin
1,300 ft. LOA , 177 ft. beam, 18,000 TEUs

Source: CMA CGM, The SF Chronicle
The Biggest Ship Ever in San Francisco Bay

CMA CGM Benjamin Franklin
1,300 ft. LOA, 177 ft. beam, 18,000 TEUs

Source: CMA CGM, The SF Chronicle
Largest Container Vessel to Call in North America:

(December 26, 2015 APMT POLA - CMA CGM Benjamin Franklin
1,300 ft. LOA and 177 ft. beam, 18,000 TEUs)

The massive Benjamin Franklin was turned in 56 hours of operations, averaging 29.1 lifts per crane, per hour, averaging total 200 container moves against the vessel each hour, for a total of 11,200 lifts..
CMA CGM Group’s US$1.5 billion order for nine LNG Powered 22,000-TEUs container ships for delivery from the end of 2019. Asia-Europe trade may be set for 24,000 TEU ships from 2019.

Source: American Shipper - Lloyd’s List
Hyundai Heavy Industries (HHI) Confirms Orders of “Megamax” Boxships to Daewoo Shipbuilding & Samsung Heavy Industries For TWELVE 23,000 TEU Container Ships (Delivery in the second quarter of 2020)

- The twelve 23,000 TEU vessels will be deployed in the Asia-North Europe trade.
- All the “ECO FRIENDLY” new vessels will be sequentially delivered in the right time to prepare for the 2020 environmental regulations.

Source: Maritime Executive September 2018
Next Generation: **Suezmax 26,000 TEUs**

26 Bays, 25 Rows - Ultra Large Container Ships (ULCS)

With a Beam of 25 rows & Length of 26 bays
(LOA: 430 meters – 1,411 feet)
the ULCS capacity could reach **26,300 TEU**.

**Port of Antwerp**: New Terminals in Europe are using 26,000 TEU design vessels

Source: DNV GL in-house methodology - “Concept Design Assessment”
## Ultra Large Container Vessels (ULCV): Megamax - 24 Era
(Post Neo-Panamax Comparative Vessel Characteristics)

### Alphaliner: Megamax - 24
MGX-24 Vessel

- **Length:** 24 Container Bay
- **Breath:** 24 Deck Rows
- **Height:** 24 Container Tiers
- **In Hold:** 12 container Tiers

### Mega Container Vessel | Alphaliner Designation | TEU Capacity | Length ft. | Beam ft. | Loaded Draft ft. | Explanatory Notes
--- | --- | --- | --- | --- | --- | ---
ACP “Neo-Panamax” | - | 12,600 | 1,200 | 160.7 | 49.90 | ACP Neo-Panamax Data
MAX Neo-Panamax | - | 14,500 | 1,201 | 158.31 | 52.49 | CMA CGM’s T. Roosevelt
**Post Neo-Panamax** | **MGX-20** | **20,000** | **1,312** | **192.49** | **52.49** | Design Vessel LNG
**Post Neo-Panamax** | **MGX-22** | **22,000** | **1,315** | **193.57** | **52.49** | CMA CGM 22,000 Option to go to 24 Rows
**Post Neo-Panamax** | **MGX-24** | **24,000** | **1,319** | **201.44** | **52.49** | 
**Post Neo-Panamax** | **MGX-26** | **26,000** | **1,411** | **209.31** | **52.49** | ULCV Suezmax 26,000 TEUs

* Calculated Value/Derived Value
A 20,000 TEU Mega-Container Vessel Can Produce High Intermodal Rail Volumes For One Weekly Vessel Call)

Vessel Capacity
20,000 TEU
(11,784 Units)

Assuming a 75% Intermodal Rail Split

26.8 Double Stacked Trains

26.8 Double Stacked Trains
Breakthrough in Terminal Automation & Remote Control of STS Cranes
Moving Crane Operations Away from the Terminal:
DP World Terminal 4 Jebel Ali Dubai (UAE)

(13 ship to shore (STS) cranes and 35 automatic stacking cranes (ASC) – By Late 2018 Port Volume will be 22.1 million TEUs > Top 3 US Ports Combined

All STS and Stacking Cranes at Terminal 4 Jebel Ali will be operated from a control room located away from the terminal.
Port of Rotterdam – Maasvlakte II
Port of Rotterdam – Maasvlakte II
Remote Ship to Shore (STS) Crane Operators
Semi-Automated STS Gantry Cranes Operations

Spreader capability to lift tandem, triple, quad & 6 pack loads
A Jump from the Current STS 100 ft. Crane Gage to a New 150 ft. STS Gantry Cranes
APM Terminals released the following graphic today showing how container cranes have evolved in size over the years.
150 ft. Gage Semi-Automated STS Gantry Cranes

Four STS Gantry Cranes
RTG Container Yard

22 to 24 outreach  150 ft. gage
Encoder Systems for modern automated STS container cranes reduce costs and increases safety
Increased STS Gage Improves Crane Stability, Reduces Wheel Loads, Decongests Quay Operations and Improves Productivity

Tandem STS Operations

<table>
<thead>
<tr>
<th>STS Gage Req. in Ft.</th>
<th>Equivalent to 12 Load Lanes</th>
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</thead>
<tbody>
<tr>
<td>95-100</td>
<td>STS Gage Req. in Ft.</td>
</tr>
<tr>
<td>115</td>
<td>8</td>
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<tr>
<td>138</td>
<td>29 m</td>
</tr>
<tr>
<td>150</td>
<td>13-14</td>
</tr>
<tr>
<td></td>
<td>46 m</td>
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Source: Liftech Consultants Inc.
The US Midwest & The Mississippi River Are the New Intermodal Freight Battle Ground
Source: NW Seaport Alliance Strategic Business Plan, May 6, 2015
US Market Penetration Via Panama Canal Expansion

(Economies of Scale)

46% Penetration, Before 2016
Via All Water, 4,500 TEU Vessels

63% Penetration, After 2016
Via All Water, 8,000 TEU Vessels

75% Penetration, 2018 & Beyond
Via All Water & Pendulum Service
14,500 TEU Vessels

Source: Potential Effects of the Panama Canal Expansion on the Texas Transportation System
New Container Port Battleground Region
(Representing 15% of the US GDP)

Source: Boston Consulting Group & C. H. Robinson
New Container Port Battleground Region
(Representing 15% of the US GDP)

Source: USDC Bureau of Economic Analysis – Boston Consulting Group Analysis
North American Cropland Intensity
(Acres of Cropland as a percent of Land Area)

Battleground Region

Percent
Less than 5
5 - 14
15 - 29
30 - 49
50 - 74
75 or more

United States
18.0 Percent

07-M085
U.S. Department of Agriculture, National Agricultural Statistics Service

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Dramatic US Market Penetration after 2017

Panama Canal Economies of Scale with permit
deeper market penetration into the US

The Midwest & the Mississippi River Valley Could be the Real Beneficiaries!

Source: ACP Expansion Project – Rodolfo Sabonge AAPA January 24, 2013
The Panama Canal will prove to be a strong contender for Asian trade serving not only the US East Coast, but ALL of the Gulf and the Most of the Midwest by 2020.
What Are The Future Mega Ship Possibilities for the Lower Mississippi River?
Historical Rules Are Changing on the Lower Mississippi River
Mississippi River Deepening: Southwest Pass to Baton Rouge
(50 to 55 foot depths are possible in the Future)

Mississippi River Ship Channel
Gulf to Baton Rouge, LA - General Reevaluation Report
Table D-32 Project Results

<table>
<thead>
<tr>
<th></th>
<th>48 Foot River Depth</th>
<th>50 Foot River Depth</th>
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<tr>
<td>Average Annual Benefits</td>
<td>$105,900,000</td>
<td>$147,810,000</td>
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<tr>
<td>Average Annual Costs</td>
<td>$103,520,000</td>
<td>$138,700,000</td>
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<tr>
<td>Net Benefits</td>
<td>$2,380,000</td>
<td>$9,110,000</td>
</tr>
<tr>
<td>BCR</td>
<td>1.02</td>
<td>1.07</td>
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</tbody>
</table>

Project authorized to 55 feet - full channel. Smaller but positive BCR at 55 feet depth.
Can Mega Container Vessels Physically Call in the Lower Mississippi River Region?
Maersk’s Triple E Container Ship
1.5 times the Size of the NEW Panama Canal Wide Body Shallow Draft 18,000 TEU Vessel
(Same Design Draft of the 8,000 TEU Susan Maersk)

(Design Draft of 14.5 Meters = 47.57 feet)
The World’s Largest Container Ships On the Mississippi River

Source: OECD/ITF
It Is Not Inconceivable that by 2030 the Lower Mississippi Design Vessel May Well be a 14,500 to 20,000 TEU Container Ship
Emerging New Inland Waterway Vessel Technology
“Deck” Barge Loaded with Containers

“Hopper” Barge Loaded with Containers

Source: USDOT Maritime Administration MARAD
Proposed Domestic AMH/Short Sea Container Services

Proposed New England Marine Highway Project's articulated tug barge short sea container service connecting New York City and Portland, Maine - 900 TEUs

Proposed MARAD ATB Ro/Con – HEC Design - 886 TEUs, Design Draft 14.1 ft. – 14 Knots
American Patriot Holdings, LLC (APH) Prototype Container Vessel

A “State of the Art” Hull Design to Ensure Optimal Speed in All River Conditions Utilizing LNG as Main Propulsion Fuel
American Patriot Container Transport, LLC. (APCT) Vessel Fleet Characteristics

<table>
<thead>
<tr>
<th>LOA Feet</th>
<th>Beam Feet</th>
<th>TEU Capacity</th>
<th>Vessel Drafts</th>
</tr>
</thead>
<tbody>
<tr>
<td>592</td>
<td>100</td>
<td>1824</td>
<td>9.0 ft. 9.6 ft., &amp; 10.0 ft.</td>
</tr>
<tr>
<td>772</td>
<td>100</td>
<td>2392</td>
<td>9.0 ft. 9.6 ft., &amp; 10.0 ft.</td>
</tr>
<tr>
<td>952</td>
<td>100</td>
<td>2960</td>
<td>9.0 ft. 9.6 ft., &amp; 10.0 ft.</td>
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<tr>
<td>1042</td>
<td>100</td>
<td>3244</td>
<td>9.0 ft. 9.6 ft., &amp; 10.0 ft.</td>
</tr>
</tbody>
</table>
American Patriot Holdings, LLC (APH)
Prototype Container Vessel

A “State of the Art” Hull Design to Ensure Optimal Speed in All River Conditions Utilizing LNG as Main Propulsion Fuel coupled with the Patented Z-Wake Bow Design.
Inland Waterway Vessel/Barge Transfer to Ocean Container Transport

Are the Cargo & Quantity Viable?

1824 TEUs to 3244 TEUs

Commercially Viable

200 - 900 TEUs
Thank You